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Preliminary Information

Volume 7-3
Technology Demonstration
Missions Data Book
D180-27477-7-3

Space Station Needs, Attributes, and Architectural Options Study

(NASA-CR-173699) SPACE STATION NEEDS, ATTRIBUTES AND ARCHITECTURAL OPTIONS STUDY Final Report (Boeing Co., Seattle, Wash.) 330 p HC A15/MF A01 CSCL 2

N84-27798

Unclas G3/18 00805



Arthur D. Little, Inc.

Battelle

Life Systems, Inc.

HAMILTON STANDARD



RCA





Microgravity Research Associates, Inc.





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Space Station Needs, Attributes and Architectural Options Study

Contract NASW-3680

D180-27477-7

Final Report

Volume 7 - 3

Data Book

Technology Development Missions

April 21, 1983

View H

for

National Aeronautics and Space Administration

Headquarters

Washington, D. C.

Approved by

Gordon Woodcock, Study Manager

Beeing Acrospace Company

P. O. Box 3999

Seattle, Washington 98124

BOSING

FOREWORD

The Space Station Needs, Attributes and Architectural Options Study (Contract NASW-3680) was initiated in August of 1982 and completed in April of 1983. This was one of eight parallel studies conducted by aerospace contractors for NASA Headquarters. The Contracting Officer's Representative and Study Technical Manager was Brian Pritchard. The Boeing study manager was Gordon R. Woodcock.

The study was conducted by Boeing Aerospace Company and its team of subcontractors:

Arthur D. Little, Inc. (ADL)	Materials Processing in Space
Battelle Columbus Laboratories	Materials Processing in Space
ECON, Inc.	Pricing Policies and Economic Benefits
Environmental Research Institute of Michigan (ERIM)	Earth Observation Missions
Hamilton Standard	Environmental Control and Life Support Equipment
Intermetrics, Inc.	Software
Life Systems, Inc. (LSI)	Environmental Control and Life Support Equipment
Microgravity Research Associates (MRA)	Materials Processing in Space
National Behavioral Systems (NBS)	Crew Accommodations and Architectural Influences
RCA Astro-Electronics	Communications Spacecraft
Science Applications, Inc. (SAI)	Space Science

This document is one of seven final report documents:

D180-27477-1	Volume 1, Executive Summary
D180-27477-2	Volume 2, Mission Analysis
D180-27477-3	Volume 3, Requirements
D180-27477-4	Volume 4, Architectural Options, Subsystems, Technology, and Programmatics
D180-27477-5-1	Volume 5-1, National Defense Missions and Space Station Architectural Options Final Report (SECRET)
D180-27477-5-2	Volume 5-2, National Defense Missions and Space Station Architectural Options, Final Briefing (SECRET)
D180-27477-6	Volume 6, Final Briefing

D180-27477-3

D180-27477-7-1	Volume 7-1, Science and Applications Missions Data Book
D180-27477-7-2	Volume 7-2, Commerical Missions Data Book
D180-27477-7-3	Volume 7-3, Technology Demonstration Missions Data Book
D180-27477-7-4	Volume 7-4, Architectural Options, Technology, and Programmatics Data Book
D180-27477-7-5	Volume 7-5, Mission Analysis Data Book

Note: The volume 7 data books will be distributed to a limited number of requestors.

The study task descriptions and a final report typical cross reference guide are found in Appendix 1.

The Boeing and subcontractor team member are listed in Appendix 2.

Acronyms and abbreviations are listed in Appendix 3.

7.3.1 Introduction

Section 7-3 is the repository for all the candidate Technology Development missions investigated during the Space Station Needs, Attributes, and Architectural Options Study. All the mission data forms plus additional information such as, cost, drawings, functional flows, etc., generated in support of these missions is included with a computer generated mission data form.

Table 7.3.1-1 is the index for the valid mission data forms. Table 7.3.1-2 is the index for the remaining mission data forms.

7.3.2 Candidate Missions

Utilizing NASA data, literature search, and Boeing data, a list of candidate Technology Development missions was developed. These missions were then researched and the resulting information entered into a Boeing VAX computer for use as a mission computer data base.

7.3.3 Mission Screening

Reviewing the mission data forms, it became apparent that there was considerable overlap with other missions and the commercial and science and applications missions. It was also determined that some missions would be accomplished on the shuttle or that they did not need to be accomplished on the Space Station. In order to organize the data base and reduce the number of missions, the missions were put through a reasonableness/overlap screen. The results of this screen resulted in Table 7.3.3-1 which gave us a reduced list of 34 valid missions, Table 7.3.1-1.

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7.3.1-1 VALID MISSIONS

BACK2001	PASSIVE HW RADIOM (LSS-3)
BACI2006	ZERO-G BROWINE PHASE SEPARATION
MCI2009	SPACE COMPONENT LIFSTIME TECH
MCI2011	LIQUID DEOPLET RADIATOR
MC12012	ION TERFSTER RFFECT 68 LBO POWER
MC12913	CREW SYSTEMS-EMESIS STATION
BACK2014	DISENASMER/CLOTHES WASHER
MC12018	FIRE SAFETY TECHNOLOGY
MCX2919	TETRER SYNAMICS TECHNOLOGY
PACK2020	LANCE SPACE POWER SYSTEM TECH
BACK2024	LOW COST MODULAR SOLAR PANEL TEC
MC12026	MMLTI-FREQ RIGH GAIN ANTENNA
MC12927	SINGLE CETSTAL REGISTER WAFERS
MCI2029	MABITABILITY CRITERIA VALIDATION
BACI2034	SPACECRAFT HARGAR (LSS-2)
BACX2035	MATERIALS EXPOSURE LAB
MCI2036	PRECISION OPTICAL SYSTEM (LSS-4)
BACI2037	COMST & STORAGE FAC (LSS-1)
BACX2059	MANIPULATOR DEVELOP & TEST FACIL
BACX2060	SHOWER STATION
BACX2061	TRASH MANAGEMENT
BACX 2063	PROP TRANSFER TECH DEMO (OTV-1)
BACI2064	PROP STORAGE TECH DERM (OTV-2)
IACX2065	MIDEYS, DOME, BRING TROE BEHO (OTY
MCX2066	OTV HAINT TECH DEMO (OTV-4)
MCX2067	PAYLOAD/OTV INTEG TECH DEMO (OTV
BACX 2068	CLOSEL ECLS FOR SPACE STATION
BACX 206 9	SOLAR ARRAY ADDITION TECH DEMO (
MCX2070	FORMATION FLYING TECH DEND (SS-2
BACI2071	SATELLITE ASSY TECH DEMO (SS-3)
PACE 2072	CO-BOARD SAT SERV TECH DEM (SS-4
MCX2073	INSITS SAT SENAMED SERV (38-5)
MCX2074	SURFACE INTERACTION W/RCS PLUME
MCX2075	ROBOTICS

TABLE 7.3.1-2 CANDIDATE MISSIONS

MCX2000	BARTH OBSERVATION INST DEV MAPS
MCX2962	EARTH OBSERVATION INSTR DEVELOP
MCX2003	SATELLITE BOPPLER HETEOR BADAR
MCI2004	MECRONAVE REMOTE SEMS TECH
MCX2005	MATE PEATURE IDENTIFICATION
BACE 2007	EARTH BOOMS ORIENTED INST NEV
MCX2006	HARGE SOLAR COLL NATURIALS & CLATING THOMHOLOGY
MCX2010 MCX2015	CRYOCHIC FLUID STORAGE TECH
MCX2016	CRYOGRNIC LIPETIME TECHNOLOGY
PACE 2017	PLJID MANAGEMENT TECHNOLOGY
BACX2021	TEST SOLAR-PUMPED LASERS
BACE 2022	LASER-TO-ELECTRIC EMERCY CONVERS
MCX2023	SOLAR-SUSTAINED PLASMAS
MCI2025	LASER COMM & TRACKING DEVELOP EX
MCI2028	LASTE PROPULSION TEST
MCX2030	MANIFULATOR CONTROLS TECH
BACX2031	SATELLITE SERVICING TECHNOLOGY
BACX2032	OTY SERVICING TECH
BACX2033	SPACECRAFT STRAIN & ACOUSTIC EMI
MCX2038	LARGE STRUCTURES TECH EXPERIMENT
BACI2039	ATTITUDE CONTROL-SYSTEM IDENT
BACX2040	ATTITUDE CONTROL-ADAPTIVE CONTRO
BACX2041	ATTITUDE CONTROL DIST CONTROL
BACX2042	ZERO-G ANTENNA RANGE COMM EXP
BACX2043	BYNAMICS OF LIGHTLY LOADED STREET
BACK2044	SPACECRAFT MATERIALS TECHNOLOGY
MCX2945	SPACECRAFT CONTROL TECH DEVELOP
B&CX2946	APPRAICED CONTENDS DEFICE TECH NEW
MCI2047	THERMAL SHAPE CONTROL TECHNOLOGY
BACK2048	ACTIVE OFFICS TECHNOLOGY
BACK2049	CEODESIC SPHERICAL STRUCTURES
BACX 2050	LARGE SPACE STRUCTURE TECHNOLOGY
BACK2051	CONTROLLED ACCELERATION PROP
BACK2052	TELEOPERATOR REAL TIME CORRE
1AGX 20 53	LARCE ANTENNA DEVELOPMENT
1AGX 20 54	FAN OF LIGHTWEIGHT CRYS HEAT PIPE
266X2055	ADV ADAPTIVE CONTROL TECH DEMO
DAGE 20 54	SGLAR PUMPID LASERS
3ACE 2057	MATERIALS PROC TECH-PROC & TECH
MCI2058	MLECTROPHORESIS SEPARATION
BACT 206 2	CRYOGENIC FLUID STORAGE TECH
BACI2076	COMPOUND SEMI COMESCIOR CETSTALS
and / V	CONTROL PROLUMENTING CRISIALS

Table 7,3.3-1. Technology Development Mission Summary

### TYPE SCIENCE AND APPLICATIONS COMMERCIAL COMBINED WITH ### SACX3000			<u> </u>	A	CCOMPLIBH IN	ar Guilliar y	
BACX2002 BASHIVE MW RADIOM (LSS-3) 10		MISSION	TYPE		COMMERCIAL		
BACX2038 PRECISION OPTICAL SYSTEM (LSS-4) BACX2037 CONST & STORAGE FAC (LSS-1) BACX2038 LARGE STRUCTURES TECH EXPERIMENT BACX2039 ATTITUDE CONTROL-SYSTEM IDENT 2031 2034 2001 2038	BACX2001 BACX2004 BACX2004 BACX2008 BACX2008 BACX2008 BACX2008 BACX2008 BACX2010 BACX2011 BACX2011 BACX2011 BACX2011 BACX2018 BACX2018 BACX2018 BACX2018 BACX2018 BACX2019 BACX2019 BACX2020 BACX2020 BACX2020 BACX2020 BACX2021 BACX2020 BACX2021 BACX2020 BACX2021 BACX2020 BACX2030	BARTH OBSERVATION INSTR DEVELOP SATELLITE DOPPLER METEOR RADAR MICROWAVE REMOTE SENS TECH EARTH FEATURE IDENTIFICATION ZERO-G BROMINE PHASE SEPARATION EARTH BOUND ORIENTED INST DEV LARGE SOLAR COLL (LSS-S) SPACE COMPONENT LIFETIME TECH MATERIALS & COATING TECHNOLOGY LIQUID DROPLET RADIATOR ION THRUSTER EFFECT ON LEO POWER CREW SYSTEMS-EMESIS STATION DIBHWABHER/CLOTHES WASHER CRYOGENIC LIFETIME TECHNOLOGY FINE SAFETY TECHNOLOGY FINE SAFETY TECHNOLOGY TETHER DYNAMICS TECHNOLOGY LARGE SPACE POWER SYSTEM TECH TEST SOLAR-PUMPED LASERS LASER-TO-ELECTRIC ENERGY CONVERS SOLAR-SUSTAINED PLASMAS LOW COST MODULAR SOLAR PANEL TECH LASER COMM TRACKING DEVELOP MULTI-FREQ HIGH GAIN ANTENNA SHINGLE CRYSTAL RHODIUM WAFERS LASER PROPIJLSION TEST HABITABILITY CRITERIA VALIDATION MANIPULATOR CONTROLS TECHNOLOGY SPACECRAFT STRAIN & ACOUSTIC EMI SPACECRAFT STRAIN & ACOUSTIC EMI SPACECRAFT HANGAR (LSS-2) MATERIALS EXPOSURE LAB PRECISION OPTICAL SYSTEM (LSS-4) CONST & STORAGE FAC (LSS-1) LARGE STRUCTURES TECH EXPERIMENT	11 10 16 10 18 11 15 15 15 11 11 11 11 12 12 12 10 14	0461 0461 0463 0463 0463 0461	COMMERCIAL	2035 2035 2084 2068 2068 2068 2068 2068 2068 2069 71-73 62-70 2035	

Table 7.3.3-1. Technology Development Mission Summary (Continued)

			AC	COMPLISHED IN		
	MISSION	TYPE	SCIENCE AND APPLICATIONS	COMMERCIAL	COMBINED	NO MISSION OR TECHNOLOGY
BACX2041 BACX2042 BACX2048 BACX2048 BACX2048 BACX2048 BACX2048 BACX2069 BACX2071 BACX2079 BACX2079 BACX2079 BACX2079 BACX2079 BACX2079 BACX2079	ATTITUDE CONTROL-ADAPTIVE CONTROL ATTITUDE CONTROL DIST CONTROL ZERO-G ANTENNA RANGE COMM EXP DYNAMICS OF LIGHTLY LOADED STRUCT SPACECRAFT MATERIALS TECHNOLOGY SPACECRAFT CONTROL TECH DEV. ADVANCED CONTROL DEVICE TECH DEM THERMAL SHAPE CONTROL TECHNOLOGY ACTIVE OPTICS TECHNOLOGY GEODESIC SPHERICAL STRUCTURES LARGE SPACE STRUCTURE TECHNOLOGY CONTROLLED ACCELERATION PROPULSION TELEOPERATOR REAL TIME COMM LARGE ANTENNA DEVELOPMENT FAB OF LIGHTWEIGHT CRYO HEAT PIPE ADV ADAPTIVE CONTROL TECH DEMO SOLAR PUMPED LASERS MATERIALS PROC TECH-PROC & TECH ELECTROPHORESIS SEPARATION MANIPULATOR DEVELOP & TEST FACILITY SHOWER STATION TRASH MANAGEMENT CRYOGENIC FLUID STORAGE TECH. PROP TRANSFER TECH DEMO (OTV-1) PHOP STORAGE TECH DEMO (OTV-2) RNDZVX, DCKG, SRTHE TECH DEMO (OTV) OTV MAINT TECH DEMO (OTV-4) PAYLOAD/OTV INTEG TECH DEMO (OTV) CLOSED ECLS FOR SPACE STATION SOLAR ARRAY ADDITION TECH DEMO FORMATION FLYING TECH DEMO (SS-2) SATELLITE ASSY TECH DEMO (SS-3) ON-BOARD SAT SERV TECH DEMO INSITU SAT UNMANNED SERV TECH DE SURFACE INTERACTION W/RCS PLUME ROBOTICS COMPOUND SEMICONDUCTOR CRYSTALS	18 15 15 15 15 15 15 15 15 15 15 15 15 15	1003	1005 1006 1006	2001 2001 2001 2001 2036 2001 2001 2036 2037 2034	X X X X

7.3.4 Costs

In order to determine the magnitude of funding required to accomplish this list of valid missions, the mission equipment was subjected to a cost analysis. All pertinent data was submitted to the Boeing cost modeling and operations analysis group for analysis using the RCA PRICE hardware, or Boeing PCM hardware computer costing models.

As a result of this analysis and a preliminary prioritizing four additional Technology Development missions were deleted from the valid list.

7.3.5 Mission Scheduling

Scheduling was an iterative process to arrive at a satisfactory blend of demands on the Space Station accommodations, mission priorities, and budget constraints. The resulting mission schedule is shown in Table 7.3.5-1.

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Table 7.3.5-1. Technology Development Schedule and Budget

	MISSIONS	FLIGHT DATE	DURA- TION (MONTHS)	COST IN MILLIONS	SOURCE
BACX2037	CONST AND STORAGE FAC (LSS-1)	91	12	61.3	TD
BACX2034	SPACECRAFT HANGAR (LSS 2)	. 91	12	6.6	TD
BACX2059	MANIPULATOR DEVELOP AND TEST FACILITY	91	24	100	SS
BACX2013	CREW SYSTEMS-EMESIS STATION	91	12	29	SS
8ACX2014	DISHWASHER/CLOTHES WASHER	91	12	1.9	SS
8ACX2060	SHOWER STATION	91	12	4	SS
BACX2061	TRASH MANAGEMENT	91	12	1.8	SS
BACX2068	CLOSED ECLS FOR SPACE STATION	91	12	51	SS
BACX2063	PROP TRANSFER TECH DEMO (OTV-1)	92	6	25.7	TD
BACX2064	PROP STORAGE TECH DEMO (OTV-2)	92	6	0	TD
BACX2069	SOLAR ARRAY ADDITION TECH DEMO	-82	1	0	TD
BACX2066	OTV MAINT TECH DEMO (OTV-4)	93	24	29.5	TD
BACX2065	RNDZVX, DCKG, BRTHE TECH DEMO (OTV)	93	' '	0	TD
BACX2071	SATELLITE ASSY TECH DEMO (SS-3)	94	36	25	TD
BACX2067	PAYLOAD/OTV INTEG TECH DEMO (OTV)	94	1	0	TD
BACX2076	FORMATION FLYING TECH DEMO (SS-2)	94	1	0	TD
BACX2072	ON-BOARD SAT SERV TECH DEMO (SS-4)	94	1	0	TD
BACX2018	FIRE SAFETY TECHNOLOGY	96	3	8.7	TD
BACX2020	LARGE SPACE POWER SYSTEM TECH	95	3	10	TD
BACX2029	HABITABILITY CRITERIA VALIDATION	95	12	1.2	TD
BACX2024	LOW COST MODULAR SOLAR PANEL TECH	95	3	1.7	TD
BACX2009	SPACE COMPONENT LIFETIME TECH	96	24	7.1	TD
BACX2027	SINGLE CRYSTAL RHODIUM WAFERS	96	3	2	TD
BACX2075	ROBOTICS	97	6	78	TO
BACX2073	INSITU SAT UNMANNED SERV TECH DEMO (SS-5)	97	1	0	TD
BACX2012	JON THRUSTER EFFECT ON LEO POWER	98	3	4.6	TD
BACX2035	MATERIALS EXPOSURE LAB	98	12	2.7	TD
BACX2006	ZERO-G BROMINE PHASE SEPARATION	99	6	3.9	TD
BACX2036	PRECISION OPTICAL SYSTEM (LSS-4)	00	12	81.1	TD
BACX2074	SURFACE INTERACTION W/RCS PLUME	01	3	.9	TD
BACX2001	PASSIVE MW RADIOM (LSS-3)	02	12	84.1	TD
BACX2019	TETHER DYNAMICS TECHNOLOGY	03	3		то
BACX2011	LIQUID DROPLET RADIATOR	05	12	66.1	TD

TECHNOLOGY DEMONSTRATION MISSIONS DATA

This section contains the mission data forms, cost analysis forms, and configuration drawings of all of the potential technology demonstration missions. The data is provided in sequence of BACX code numbers.

PAYLOAD ELEMENT HALE PASSIVE IN KADION (LSS-3) BACX2061 () So	TYPE cience and Applications (Non-comma.) () Commercial
CONTACT Name RICHARD GATES Address BOEING AEROSPACE CO PO BOX 3999 SEATTLE, WA 98124	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone 206/773-2020 STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
Desired First Flight, Year: 2002 Number of Flights 1 Duration	of Flight, Days 0
LARGE SPACE STRUCTURES TECHNOLOGY DEMONSTRATIONS: DEPLOYMENT AND ASSEMBLY, SUBSYSTEM INSTALLATION AND CHECKOUT, DEMONSTRATE MAN'S ROLE AND CAPABILITIES IN SPACE, DEPLOYMENT OR INSTALLATION OF MEMBRANE SURFACE, SYSTEM IDENTIFICATION, ADAPTIVE CONTROL, ANTENNA TESTING, STRUCTURAL DYNAMICS, THERMAL CONTROL, SURFACE MANAGEMENT AND CONTROL, DAMPING AUGMENTATION, AND POINTING CONTROL.	
ASSEMBLE THE PASSIVE MICROVAVE RADIOMETER SATELLITE. DURING THE ASSEMBLY, THIS SPACECR INSTRUMENTED AND TESTED TO DEMONSTRATE THE VARIOUS TECHNOLOGIES DEFINED ABOVE. AFTER T	ECH PERATIONAL.
DESCRIPTION ASSEMBLE THE PASSIVE MICROVAVE RADIOMETER SATELLITE. DURING THE ASSEMBLY, THIS SPACECR INSTRUMENTED AND TESTED TO DEMONSTRATE THE VARIOUS TECHNOLOGIES DEFINED ABOVE. AFTER T DEMOS ARE COMPLETED, THIS SPACECRAFT WOULD BE MOVED TO ITS DESIRED LOCATION AND MADE O	ECH PERATIONAL.
ASSEMBLE THE PASSIVE MICROVAVE RADIOMETER SATELLITE. DURING THE ASSEMBLY, THIS SPACECR INSTRUMENTED AND TESTED TO DEMONSTRATE THE VARIOUS TECHNOLOGIES DEFINED ABOVE. AFTER T	ECH
ASSEMBLE THE PASSIVE HICROVAVE RADIOMETER SATELLITE. DURING THE ASSEMBLY, THIS SPACECR INSTRUMENTED AND TESTED TO DEMONSTRATE THE VARIOUS TECHNOLOGIES DEFINED ABOVE. AFTER T DEMOS ARE COMPLETED, THIS SPACECRAFT WOULD BE MOVED TO ITS DESIRED LOCATION AND MADE OF Geosynchronous Orbit () Yes (X) No Aposee, km >600 Perisee, km >600 Tolerance + -	PERATIONAL. OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km >600 Inclination, deg 60 Nodal Angle, deg Escape dV Required, m/s POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec AND TECHNOLOGIES DEFINED ABOVE. AFTER TO DENOS TECHNOLOGIES DEFINED ABOVE. AFTER TO DENOS TO TO THE ASSEMBLY, THIS SPACECR (X) No Apogee, km >600 Perigee, km >600 Tolerance + - Ephemeris Accuracy, m Escape dV Required, m/s (1) Inertial (1) Solar (X) Earth (1) Any Field of View (deg) 1	PERATIONAL. OF POOR

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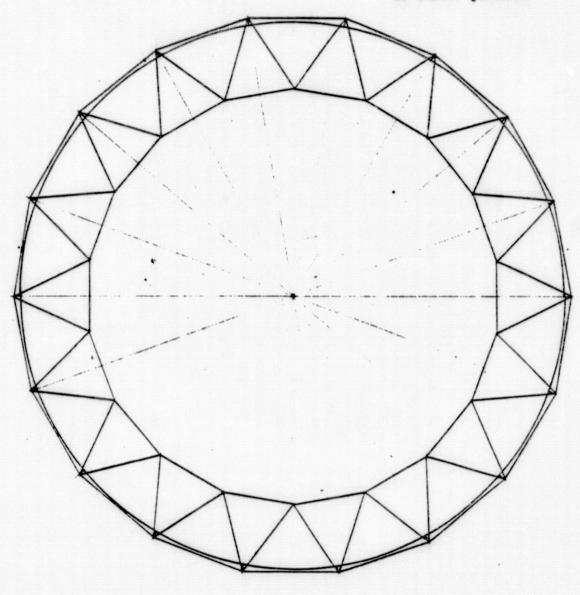
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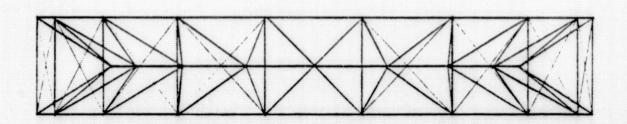
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    OTV or THS on Orbit
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                                           365 days/year
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20 man-days/year
148 man-days/year
    Hission Use
    IVA Service
EVA Service
    Experiment Ops
                                              4 times/year
    Service Frequency
Delta Velocities
    Up
    Down
    Aero Return
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                                    14 FES 1983 ***
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                                               42220
                                   -1 /63 .777 ....
       *** FOR MODEL REVISION NIME
MANUFACTURING **** MANUFACTURING **** MANUFACTURING **** MANUFACTURING
                            ******* BOEING ******* 3UB/OFE
                                   HOURS DOLLARS
                                                      TOTAL
                            B.F.L.
                                                     DOLLHAS
STRUCTURE STRUCTURE 4390 5 3 0 50
                             133462. 23019. 21101008.
MAC ASSY & C/G 9 5 0 0
                             14063. 2107. 1933661.
61 ELECTRICAL SYSTEM
ET RECEIVER 10 5 3 0 60
                              3449.
                                       517.
                                             474264.
End ASSY & C/G 0 5 0 0
                                      57.
       *** FCM MODEL REVISION NINE
                                    14 FEB 1483 AAA
... FORTHER BORING ** FCM HOURS SUMMARY HOURS FCM FK BURE HORRORING ****
TITLE: PASSIVE MICROWAVE RADIOMETER (SS TEST MARIMANE)
      SCEING HARDWARE SUBSYSTEM HOURS
                                         A.F.L. Sec.
 AL TERUSTORE
CL SUPETFRIGAL SYSTEM
       SORING SUBTOTAL
                          251.4
```

HARBWARE COTTON & 5 5 5

me 18 1. 10 1 10 1 10 2 1 1 1 1 1 1 1 1

OF	POOR	PAGE I	Y

SCEING SUPFORT HOURS	
ENGINEERING & INTEGRATION	532.3
THARE ENGINEERING	1541.
TEMS GROUND TEST CONDUCT	96365
STEMS FLIGHT TEST CONDUCT	0
JUPPORT EQUIPMENT DESIGN	39127
SUPPORT EQUIPMENT MFG .	27422
TOOLING & SPECIAL TEST EQUIPMENT	13328
SPARES	19706
LIAISON ENGINEERING	18064
DATA	35867
PROGRAM MANAGEMENT (ENG)	94177
PROGRAM MANAGEMENT (MFG)	50869

																		M														
	*			100		* *	44		**	141		**			٠,						* *		**	**	**	 3.3	**	* *	* *	**	***	*
		5	DE	13	16	D	2	I	GN		2	DE	V	51	HU	F	HE	UF	8									3	26	60)	*
*		B	GE	IN	13	H	AF	0	we	RE	E	38	L	\$	ü	C	HO	iui	15									:	25	60	0	*
*		BI	DE	IN	1G	5	UF	P	GR	T	H	QU	RE	3														4	: 3	301	0	*
																																*
*		8	DE	IN	łĜ	P	RC	G	RA	M	7	20	R		. 0	101	11	AL		SC	HE	.11	JL.	2				10.		10	2	*
*	**		**	**	*	* *	*		**	*	4.4	* *	4	*	* *							*							* *	* *		*
CM	1	10	DE	L	R	EV	1:	31	GN	ŧ 1	NI	NE					1	14	F	Eb	1	7	11									
-		nistana e	m	-		-		Mar -	-	-																1746						

TITLE: FASSIVE MICROWAVE RADIOMETER (SS TEST HARDWARE?

	CEVEL:	FAENTAL
	ENGS.	HARDWARE

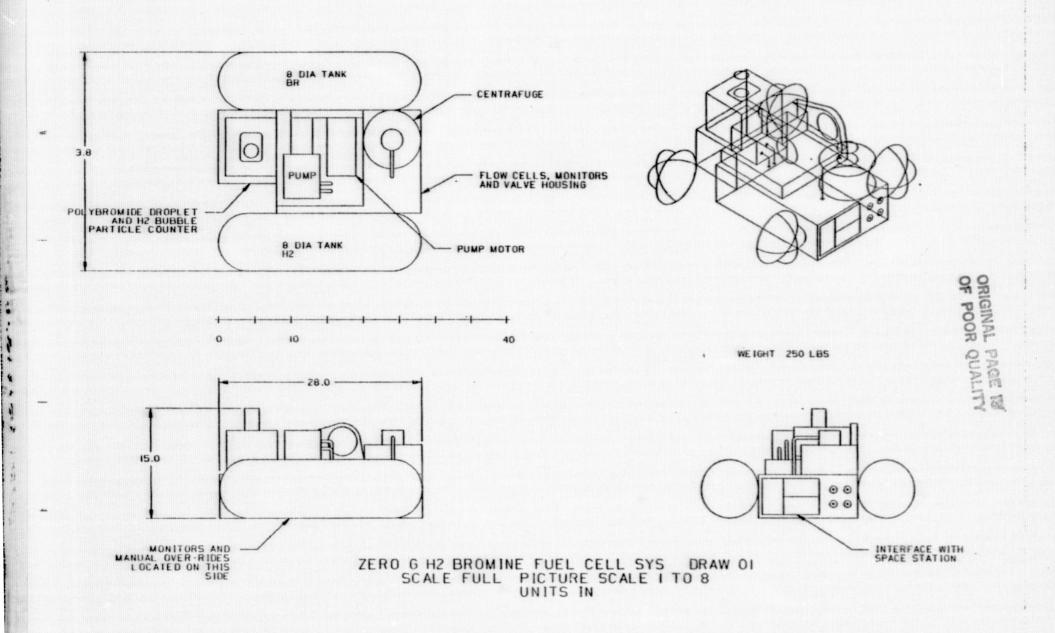
HARDWARE SUBSYSTEM COST (\$M)		
\$1 STRUCTURE	21.752	23.035
12 ELECTRICAL SYSTEM	0.234	0.527
SUBSYSTEM HARDWARE SUBTOTAL (DM)	22.235	23.561
SFE/ SUBCON/GIVEN COST (#M)		
	0.0	0.0
SUBCON/GIVEN (31-850) SUBTOTAL (3M)	0.0	0.0
HARDWARE ASSEMBLY & C/O		3.334
HARDWARE SUBTOTAL (\$H)		27.095
JUREART COST (SH)		
CYSTEM ENGINEERING & INTEGRATION	. 3.447	
COFTWARE ENGINEERING	1.245	
SYSTEMS GROUND TEST CONDUCT	7.372	
SYSTEMS FLIGHT TEST CONDUCT	0.0	
PECULIAR SUFPORT EQUIPMENT	2.738	2.861
FOOLING & SPECIAL TEST EQUIPMENT		1.579
SHARES		2.336
LIHISON ENGINEERING	1.080	2.330
BATA	11.152	
PROGRAM MANAGEMENT	4.781	3.652
PRODUMI MARAGEMENT	0.701	3.000
SUPPORT EFFORT SUBTOTAL (SH)	24.707	7.349
SUFFORT SUBTOTHE (PH)	=4.707	7.007
TOTAL (SM) (NOMINAL SCHEDULE)	47.144	36.765

	HAME PHASE SEPARATION	CODE BACX2006		TYPE {
	STALHAKER B RESEARCH CENTER			(X) Technology Development () Operations () Other () National Security Type number (see table A) 11
Telephone				Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
() Operational	l () Approved () Planned (X) Candida	te () Opportunity	Scale = 5
Desired First Fl	light, Year: 199 9	Number of Flight:	s 1 Duration	of Flight, Days 180
POLYBROHIDE COMITINATION A UPIGUITLESS DESIGNING ZING I FOR SPACE APPLICATION OF THE PROPERTY	PLEX AND HYDROGEN GOOD TO SERVITOR THE INTERPOLATIONS D. POLYBROMIDE COMPANY CONTRACTOR THE TWO LIGHT FOR THE TWO LIGHT FRIFUGE. THE LIGHT	INULATE FLOW-BY AND FLOW-	E SOLUTION FOR FUEL CELLS MIXED INTO A SINGLE HONOGEN THROUGH ELECTRODES, VARIOUS BIASE ARE THEN SEPARATED INTO D AGAIN, THE SIZE AND OUANTI	MIXING CONDITIONS
THE CENTRIFUGE.			DAT THE TRABIL AND COTELES	POOR
ORBIT CHARACTER Geosynchronor Apogee, km Inclination, Hodal Angle, Escape dv Rec	ISTICS () Y soft () Y footnotes	es (X) No Perigee, km 500	Tolerance + - Tolerance + - Ephemeris Accuracy, M	OF THE HIXERS AND
ORBIT CHARACTER Geosynchronor Apogee, km Inclination, Hodal Angle, Escape dV Record Pointing/ORIENT View Direction Truth Sites Pointing Accepointing Stal	ISTICS () Y 500 deg 28. deg deg quired, m/s .	es (X) No Perigee, km 500 Inertial () Solar	Tolerance + - Tolerance + - Ephemeris Accuracy, M	PAGE
ORBIT CHARACTER Geosynchronor Apogee, km Inclination, Hodal Angle, Escape dV Record Pointing/ORIENT View Direction Truth Sites Pointing Accepointing Stal	ISTICS 500 500 28. deg 28. deg 401red, m/s . ATION (If known) uracy, arc-sec bility (Jitter), ar	es (X) No Perigee, km 500 Inertial () Solar	Tolerance + - Tolerance + Ephemeris Accuracy, w	PAGE

DATA/COLGAUNICATIONS Nonitoring Requirements: () Realtime () Encription/Decription Re	(X) Offline () Other:	
(X) On-Board Data Processing	d Rate (KBS): Frequency (MHz):	· ·
Description: Data Types: (X) Analogous (X) Analogous (X) Analogous (X) Analogous (X) Analogous (Bours/Day): Live TV (Hours/Day): On-Board Storage (Mbit) Data Dump Frequency (Pe Recording Rate (KBPS)	(X) Digital Hours/Day Voice (Hours/Day): Other:	
THERMAL () Active (X) Passive		
llo	erational Minimum Maximum n-operational Minimum Maximum	
Heat Rejection, w Op No	erational Minimum Maximum N-operational Minimum Maximum	
Launch mass, Consumable T	() Pressurized (X) Unpressurized (I) U, m: .30 H, m: .40 Stowed (I) W, m: .30 H, m: .40 Deployed (I) Return mass, kg:	ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size 1	Task Assignments	PAGE IS
Skills (See Table B)	Skill 3	AL SE
	Level 3	1 2 2
	Hours/Day	
EVA (X) Yes () No	Reason TEST Hours/EVA 300	
SERVICING/MAINTENANCE Service:	Interval, days Consumables,	kg
Configuration Changes:	Returnables, kg Han hours Interval, day Man/Hours Req Deliverables, kg Returnables,	uired kg

SPECIAL CONSIDERATIONS/See Instructions

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Boeing-Specific Input Data
                                                       OPS CODE
MISSION TYPE
   Free Flyer
      ) llot Serviced
        Remote THS
Remote Hanned
                                                          FT
        Serviced at Station (TMS Retrieved)
                                                          FST
   ( ) Serviced at Station (Self-propelled)
                                                          FS
   Platform Based
        Not Serviced
                                                          PT
        Remote THS
       Remote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                          PM
PST
                                                          PS
   Other
(X) Space Station Based
                                                          SS
    ( ) Sortie
                                                          SOR
CONSTRUCTION/SERVICING COMPLEXITY (X) Low.
                                                                                                                                               OF POOR QUALITY
        Hedium
    ( ) High
Operations Times
   OTV Up/Down
                                         0 days
                                       0 days
180 days/year
15 man-days/year
   OTV or THS on Orbit
   Mission Use
IVA Service
   EVA Service
                                         4 man-days/year
   Experiment Ops
                                       100 man-days/year
                                         1 times/year
   Service Frequency
Delta Velocities
   Up
   Down
   Aero Return
Support Equipment
                                                                                                                            (Stowed)
(Deployed)
                Length:
Length:
                                                                                         Height:
                                    meters
                                                    Width:
                                                                        meters
                                                                                                              meters
                                    meters
                                                                        meters
                                                                                                              meters
               llass:
                                    kg
Manifest Restrictions
    (X) No Restrictions
        Only with compatible payloads
     Fly-Alone
Must have Docking Module
Length of Beam Fab
Emaber of Appendages
Humber of Hodules Required to Assemble the Payload 1
```



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TY SPACES PCHOUT
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START S

REVISION NINE (15 FEBRUARY 1982)

CASE SPACE STATION HARDWARE (DEV)
WHAP 60 95 130 50 120 60 30 15
AEHOTE 0 0
ASUPPORT 1 .3 1 .5
SSUPPORT .5 1 1 1
WEISHT 0 0 5 7920
SCHEDULE 0 0
FINAL 1 0
FINAL 1 0
FISHT 0. 0
TOOLING .2
SPARES 10
BETS 1
CLASS 0
MILL 1
DEV

*** FCM MODEL REVISION NINE

18 FEB 1983 ###

	*******	MILLIONS	********			*********	SUB/GFE
				DESIGN	DEV SHOP	DES & SHOP	
				HOURS	HOURS	SOLLARS .	DOLLARS

53		PLET RADIA					
#2	HEAT EXCHA	ANGER SOLO	400				
				94140	28842.	8.508	
#7	DROPLET GE	ENERATOR-ST	RUCTURE 660				
				37327	17198.	5.073	
42	DROPLET GE	ENERATOR 15	40 5 0 0				
				34145	. 10243.	3.022	
144	PIFING 440	0 3 0 0					
				4057	. 1218.	0.339	
42	COLLECTOR	220 4 0 0					
				5457	. 1637.	0.463	
HI	INTEGRATIO	ON & TEST. O	400				
				25394	. 7518.	2.247	
EN)						
		in .			trans authoritation		

*** FCM MODEL REVISION NINE

18 FEB 1783 ***

10 . m. 1 . m. 1 . m. 2 . m. 2

	********	MILLIONS	*********			MANUFACTUR	TOTAL
						LCLLARS	DOLLARS
				H00K3			
3	LIQUID DRG	PLET RADIA	TOR				
12	HEAT EXCHA	NGER 3060 :	3 3 0 0				
				79.55.	11348.	10.403	
7	DROPLET GE	NERATOR-ST	RUCTURE 660	4 3 0 0			
				26092.	3914.	1.588	
2	DROPLET GE	NERATOR IS	40 5 3 0 0				
-	D	memmion		17655.	4148.	1.803	
4	PIPING 440			-,			
4	PIPING 440	2 200			1075.	1.005	
				7307.	1975.	1.000	
-	COLLECTOR	220 4 3 0	•				
				4851.	727.	0.558	
AC	HARDWARE A	SSEMBLY 1	CHECKOUT O	0 0			
				10025.	1234.	1.378	
a D							
rep			REVISION N	*110		483 +++	
	***	run nubel	- VEATOTON .	11.15			

	SCETNGARDE	TNG KA P	CM HOURS SU	MANARY HOUR	71.7	** BUELNGARD	E 1713 ##

TITLE: SPACE STATION HARDWARE (DEV)

Frank Barri			***		. 4.3	•
END	### PCH	HODEL REV	ISION NINE	13 FEB	1463 148	
******	********	*******	***********	*********	******	
			OURS SUMMARY			
TITLE:	SPACE STAT	ION HARDWA	RE (DEV)			
	SOEING HA	RDWARE SUB	SYSTEM HOLRS			
			DESIGN	DEV SHOP	8.7	3.6
93 LIQU	ID DROPLET	RADIATOR	222521	66776	151375	2273
	BOEING SU	BTGTAL	222521	46754	151395	2273
			HARDWA	ARE ASSEMBLY	1 0/0	24150
SYSTEM	ENGINEERIN	PPORT HOUR		37606		
	E ENGINEER			7783		
	GROUND TE			46957		
	FLIGHT TE			7722		
	EQUIPMENT			7340		
	& SPECIAL		PHENT	20920		
SPARES				17433		
LIAISON	ENGINEERI	ING		15781		
DATA				19996		
FROGRAM	MANAGEMEN			68080		
PROGRAM	MANAGEMEN	T (MFG)		44001		

BGEING HOURS SUMMARY RECAP

BOEING HOURS SUMMARY RECAP

* BOEING DESIGN & DEV SHOF HOURS 239200 #

* BOEING HARDWARE BFL & GC HOURS 297800 #

* BOEING SUPPORT HOURS 297800 # # .. BOEING PROGRAM HOURS (NOMINAL SCHEDULE) ******** *** PCH MODEL REVISION NINE 18 FEB 1783 644

TITLE: SPACE STATION HARDWARE (DEV)

1

0

0

	DEVELO	PHENTAL
	LNGR.	HARDWARE
HARDWARE SUBSYSTEM COST (\$M)		
33 LIQUID DROPLET RADIATOR	17.693	20.84
30 LIGOID PROFEET RAPIATOR	******	
SUBSYSTEM HARDWARE SUBTOTAL (\$M)	17.473	10.84
FE/SUBCON/SIVEN COST (#M)		
	.5	0.7
SUBCON/GIVEN (S1-850) SUBTOTAL (M.	.0.0	0.0
HARDWARE ASSEMBLY & C/O:		3.12
HARDWARE SUBTOTAL (SM)		23.97
SUPFORT COST (SM)		
SYSTEM ENGINEERING & INTEGRATION	2.256	
SOFTWARE ENGINEERING	0.792	
SYSTEMS GROUND TEST CONDUCT	3.592	
SYSTEMS FLIGHT TEST CONDUCT	0.0	
PECULIAR SUPPORT EQUIPMENT	0.665	0.756
TOOLING & SPECIAL TEST EQUIPMENT		2.51
SPARES		2.08
LIAISON ENGINEERING	0.957	
DATA	1.200	
PROGRAM MANAGEMENT	4.702	2.64
SUFFORT EFFORT SUBTOTAL (\$M)	14.387	a.00:
TOTAL (\$M) (NOMINAL SCHEDULE)	34.080	31.97

PAYLOAD ELEMENT NAME SPACE COMPONENT LIFETIME TECH BACX2009	TYPE () Science and Applications (Non-comm.)
CONTACT Hame DAVID ENNIS Address AMES RESEARCH CENTER	(X) Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Scale = 7
Desired First Flight, Year: 1996 Number of Flights 1 Duration	of Flight, Days 720
OBJECTIVE TO PROVIDE A TECHNOLOGY BASE FOR THE DEVELOPMENT OF DIVERSE HARDWARE COMPONENTS FOR UNION A MULTI-YEAR OPERATIONAL LIFETIME UNDER SPACE COMDITIONS IS SPECIFIED.	
DESCRIPTION THE PROPOSED HISSION WOULD CHARACTERIZE THE PERFORMANCE LIFETIME OF CRITICAL COMPONENT SPACE TECHNOLOGIES. COMPONENTS REQUIRING EVALUATION IN THE SPACE ENVIRONMENT INCLUDE POSYSTEMS; SOLAR CELL AND CHEMICAL BATTERY POWER UNITS; SPACE QUALIFIED SOLID FILM LUBRICANTS; LASER AND CONVENTIONAL SPIN GYROS; MICROWAVE AMPLIFIER CATHODS; AND SECONDARY CONVENTIONAL SPIN GYROS; MICROWAVE AMPLIFIER CATHODS; AND SECONDARY CATHODS; AN	RIMARY PROPULSION PACE SUITS.
	OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Ilodal Angle, deg 0 Ephemeris Accuracy, m Escape dV Required, m/s 0.0	R QUALITY
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Operating 0 0.00 Standby 0 0.00 (X) Continuous Peak Voltage, V 0 Frequency, Hz 0	

California Calaboration of the Calaboration of

Honitoring Requirements: () Realtime () Encription/Decription R () Uplink Required: Comma () On-Board Data Processin Description:	equired nd Rate (KBS): 0 g Required		Frequency (MIZ				
Data Types: (X) Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit)	0		Nours/Day Voice (Hours/D Other:	ay): 0.00			
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit) 0		Downlink comma Downlink Frequ	nd rate: ency (Mlz):	0.00		
HERMAL (X) Active () Passive							
Temperature, deg C Op No Neat Rejection, w Op	erational Minimum n-operational Minimum erational Minimum	8	Maximum Maximum Maximum	8			
No	n-operational Minimum	ő	Maximum	ŏ			
Location () Internal Equipment ID/Function L, m: L, m:	(X) External (X) Pressurized 50 W, m: .50 50 W, m: .50	() H, m		Stowed Deployed			
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration	(X) Pressurized 50 W, m: .50 50 W, m: .50 kg: .45		: .50 : .50 rn mass, kg:	Deployed 0			ORIGINAL OF POOR
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration	(X) Pressurized 50 V, m: .50 50 V, m: .50 kg: 45 ypes Sensitivity, (g) Task Assignments	min: 0.	: .50 : .50 rn mass, kg: 00E+00 max:	0.00E+00			ORIGINAL PA
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 50 W, m: .50 50 W, m: .50 kg: 45 ypes Sensitivity, (g)	min: 0.	: .50 : .50 rn mass, kg: 00E+00 max:	0.00E+00	 		ORIGINAL PAGE OF POOR QUAL
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 50	min: 0.	: .50 : .50 rn mass, kg: 00E+00 max:	0.00E+00	 <u> </u> <u> </u>		ORIGINAL PAGE IS
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 50	min: 0.	: .50 : .50 rn mass, kg: 00E+00 max:	0.00E+00	 		ORIGINAL PAGE IS OF POOR QUALITY
Acceleration CREW REQUIREMENTS Crew Size Skills (See Table B)	(X) Pressurized 50	min: 0.	: .50 : .50 rn mass, kg: 00E+00 max:	0.00E+00		0.00	ORIGINAL PAGE IS OF POOR QUALITY

SPECIAL CONSIDERATIONS/See Instructions

- - - PRICE 84 - -ELECTRONIC ITEM

DATE 4-MAR-83

TIME 10:47 (283010) FILENAME: REID.DAT

SPACE COMPONENT TECH LAB EQUIPMENT

		TINU	WEIGHT	100.00	MODE	1
PROTOTYFE QUANTITY	3.000	TINU	VOLUME	5.00	QUANTITY/NHA	1
FROGRAM COST(\$ 1000)	DEVELO	PMENT	FRO	DUCTION	TOTAL COST	
ENGINEERING						
DRAFTING	1	47.		-	147.	
DESIGN	3	49.		-	349.	
SYSTEMS		19.		-	19.	
PROJECT MGMT	11	41.		-	1141.	
DATA	1	20.			120.	
SUBTOTAL (ENG)	17	76.			1776.	
					• .	
MANUFACTURING						
FRODUCTION		-		-		
PROTOTYPE	39	97.			3997.	
TOOL-TEST EQ	13	67.		-	1367.	
SUBTOTAL (MFG)	53	64.		-	5364.	
TOTAL COST	71	40.			7140.	

OF POOR QUALITY

PAYLOAD ELEHENT NAME LIQUID DROPLET RADIATOR CODE EACX2011	TYPE Science and Applications (Non-comm.) Commercial
COUTACT Haue THEODORE MOZ Address HASA-LEWIS RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 16
Telephone 216 433-4000 X67	. non fulue, but could out
STATUS () Operational () Approved () Planned () Candidate (X	10 = Vital Opportunity Scale = 5
Desired First Flight, Year: 2005 Number of Flights	Duration of Flight, Days 365
OBJECTIVE DEMONSTRATION AND TECHNICAL VERIFICATION OF AN ADVANCED LIQUID DRO SPACE RADIATOR CONCEPT UNDER ACUTAL OPERATIONAL SPACE STATION COM (ZERO-GRAVITY, SPACE VACUUM, SPACE PLASMA, ATTITUDE CONTROL MANEUV PERTURBATION, ETC., DURING LONG DURATION OPERATIONS). DETERMINE OF TIONAL CHARACTERISTICS, CONSTRAINTS AND EFFECTS OF SPACE STATION/ RADIATOR INTERFACE.	DPLET DITIONS VERING PERA-
DESCRIPTION THE CANDIDATE LIQUID DROPLET RADIATOR SYSTEMS COULD BE INTEGRATED, MANAGEMENT SYSTEM AT THE HEAT REJECTION INTERFACE POINT. THE SYST AUXILLIARY EXPERIMENTAL HEAT REJECTION SYSTEM. WASTE HEAT LOAD NOT OPTION A SEPARATE HEAT SOURCE COULD BE USED) COMMENSURATE TO THE IT WOULD OPERATE AT ACTUAL SPACE STATION RADIATOR CONDITIONS OF IN VACUUM, SOLAR RADIATION, ATTITUDE CORRECTION AND MANEUVERING PERTOPLASMA. PERFORMANCE WOULD BE EVALUATED FOR EFFICIENCY OF WASTE HE EUTION CONTROLABILITY, FLOW RATE, POTENTIAL OF LOSS OF WORKING FLOW VAPORIZATION AND MANUEVERING AND EFFECT OF SPACE PLASMA INTERFACE	EM ASSEMBLY WOULD BE INSTALLED AS AN JILD BE SUPPLIED BY THE SPACE STATION (AS AN SIZE OF THE LIQUID DROPLET RADIATOR SYSTEM. ILET AND OUTLET TEMPERATURE, ZERO GRAVITY, JUBERATIONS AND UITH THE NTERFACE OF SPACE AT REJECTION, RESPONSE, TEMPERATURE DISTRI- JUD AND SPACE STATION CONTAMINATION DUE TO
Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 To Inclination, deg 28.5	lerance + - ALE
POINTING/ORIENTATION View Direction Truth Sites (if known) (X) Inertial () Solar (
POWER () AC (X) DC Power, W Duration, Hrs/Day	
Operating 1000 24.00 (X) C	ont inuous
Peak Voltage, V Frequency, Hz	

DATA/COMMUNICATIONS Unitoring Requirements: () None () Realtime () Encription/Decription R () Uplink Required: Comma (X) On-Board Data Processin Description: Data Types: (X) Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit) Data Dump Frequency (Pe Recording Rate (KBPS)	equired nd Rate (KBS): g Required g (X) Digital	Frequency (Mz): 0.00 Hours/Day Voice (Hours/Day): Other: Downlink command rate: Downlink Frequency (Mz):	
THERNAL (X) Active () Passive Temperature, deg C Op No Neat Rejection, v Op No	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Maximum Haximum Haximum Maximum	
FORT DUTCHT DRVCTCAL CHARACTERIC	TICS	/ > -	
L, m: 10 Launch mass, Consumable T	.00 W, m: .50 .0 W, m: .50 kg: 3600	() Remote (X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Return mass, kg: n: 0.00E+00 max: 0.00E+00	ORIGI OF PO
L, m: 10 L, m: 10 Launch mass, Consumable T	.00 W, m: .50 .0 W, m: .50 kg: 3600	(X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Return mass, kg:	OF POOR
L, m: 10 L, m: 10 Launch mass, Consumable T Acceleration	.00 W, m: .50 kg: 3600 ypes Sensitivity, (g) mi	(X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Return mass, kg:	ORIGINAL PA
L, m: 10 L, m: 10 Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 3	.00 W, m: .50 kg: 3600 ypes Sensitivity, (g) mi	(X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Réturn mass, kg: n: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE OF POOR QUALI
L, m: 10 L, m: 10 Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 3	.00	(X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Réturn mass, kg: n: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS OF POOR QUALITY
L, m: 10 L, m: 10 Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 3	.00 U, m: .50 .0 W, m: .50 kg: 3600 ypes Sensitivity, (g) min	(X) Unpressurized H, m: 5. Stowed H, m: 15. Deployed Réturn mass, kg: n: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS OF POOR QUALITY

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Boeing-Specific Input Data
                                                         OPS CODE
HISSION TYPE
   Free Flyer
      ) Not Serviced
        Remote TIIS
Remote Hanned
                                                             FT
FII
        Serviced at Station (TMS Retrieved)
                                                             FST
                                                             FS
    ( ) Serviced at Station (Self-propelled)
    Platform Based
      ) Not Serviced
        Renote THS
                                                             PT
        Remote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                             PH
                                                             PS
    Other
(X) Space Station Based
() Sortie
                                                             SOR
                                                                                                                                                     OF POOR
CONSTRUCTION/SERVICING COMPLEXITY

(X) Low | Hedium
    ( ) High
Operations Times
   OTV Up/Down
                                             days
    OTV or THS on Orbit
                                             days
    Mission Use
IVA Service
                                             days/year
man-days/year
                                        10
                                         20
    EVA Service
                                             man-days/year
                                        20
                                             man-days/year
    Experiment Ops
   Service Frequency
                                             times/year
Delta Velocities
   Up
   Down
Aero Return
Support Equipment
                                                                                                                             (Stowed)
(Deployed)
                Length:
Length:
                                                     Width:
                                                                                          Height:
                                     meters
                                                                        meters
                                                                                                               meters
                                                                                                               meters
                                     meters
                                                                        meters
                Mass:
                             500
                                      kg
Hanifest Restrictions
    (X) No Restrictions
    ( ) Only with compatible payloads
Fly-Alone
Hust have Docking Hodule
Length of Beam Fab
Humber of Appendages
Humber of Required to Assemble the Payload
```

OF POOR QUALITY - grassiste vibertor · suil · 149
- fluit pring to prossurize 1111 - 1000 prossur
- fluid - 1 port, \$ 70,
- 21-ssure sensors, \$100 meters, control valves . nrss 1000kg ... for stend it zonky) Colle TOR MASS = 100 kg 2 - 13 -fr. til 11:0 - \$10/cm2 - Aluminum mandrel - 150 Dising Complexity a 2 - Aleminum tubing to heat exchangel

Hop 1.3 1.1472 Voleme : 1.5 m3

Noving PHETS

Fig. 8. Retractable Liquid Droplet Radiator.

Pilling - MASS = \$60 kg

ORIGINAL PAGE 19 OF POOR QUALITY

TY SPACES PEMOUT

START 5

DEV

REVISION NINE (15 FEBRUARY 1982)

CASE H2-BROWINE FUEL CELL SYSTEM--SPACE TEST HARDWARE DWRAP 60 95 130 50 120 60 30 15 REHOTE 0 0 REMOTE 0 0
SSUPPORT 1 .3 1 .3
SSUPPORT 3 1 1 1 1
WEIGHT 0 0 F0 250
SCHEDULE 0 0
FLINAL 1 0
FLIGHT 0 0 TOOLING .2 SPARES 10 -SETS 1 CLASS 0 HILL 1

*** PCM MODEL REVISION NINE 13 FEB 1933 ***

TRANSPORTATION TO THE TRANSPORT TO THE T

	*********	MILLIONS	*********	DESIGN I	EV SHOP DES	1 SHOP 0LLARS	SUB. OFE TOTAL DOLLARS
B1	TOTAL FUEL			00			
H4	PUMF 15 5			53.	10.	5.005	
33	FUMP HOTOR	15 5 0 90		44.	13.	3.004	
и2	STRUCTURE	68 5 0 0		1416.	425.	0.125	
X3	CENTRIFUGE	15 5-0-90		1966.	590.	0.174	
215	CENTRIFUGE	20 5 0 90		1415.	425.	0.125	
M3	BROKINE TAN	NK 35 5 0 9	70		30.	3.010	
H3	HI TANK 10	5 0 90		74.	21.	0.004	
24	ELECTRONICS ELECTRONICS						
EH				13.	4.	0.001	

*** PCM MODEL REVISION NINE 18 FEE 1983 ***

#ANUFACTURING **** HANUFACTURING **** MANUFACTURING *** MANUFACTURING **** MANUFACTURING

	5839555555 MILLIONS 555555555	*******	* BCEING		SUB/GFE
		HCURS	G.C. HOURS	MANUFACTUR ICLLARS	TOTAL DOLLARS
b .					
342	BUBBLE PARTICLE COUNTER 60 5 3 0	100			
		1510.	224.	0.208	
144	PUMP 15 5 3 0 70				
		477.	72.	0.065	
X3	FUMP HOTOR 15 5 3 0 90				
		1515.	342.	0.222	
142	STRUCTURE 48 1 3 0 0				
		17"	270.	9.271	
X3	CENTRIFUGE 15 5 3 0 90				
		1013.	242.	0.222	
itü	SENTRIFUGE 20 5 3 0 90				
		300.	125.	0.110	
3	BROMINE TANK 35 5 3 0 70				
		903.	1+5.	0.130	
4.4	-1 fage: 55 ff \$ 5 fo				

	v.t	PUMP HOTOR 15 5 3 v 7v							
		STRUCTURE 68 5 3 0 0	1615.	24	2.	0.222	1		
			1974.	47		0.271		ORIGINAL	DACE IS
	X3	CENTRIFUGE 15 5 3-0 90	1015.	2+		0.22.			
	HS	CENTRIFUGE 20 5 3 0 90		12				OF POOR	QUALITY
	H3	BROMINE TANK 35 5 3 0 90							
,	мз	H2 TANK 20 5 3 0 90 *	733.	1+		3.13			
			611.	9.	2.	0.08	. / .		
		ELECTRONICS 2 3 3 0 100							
	END		625.	7	4.	0.088			
		*** FCM HODEL REVISION NIN	Ε	18 FEB	1983	***			
	***	SOEINGASOEING AF PCM HOURS SUMM	ARY HOUR	S FEM	** 50	EING #80	ETH& 6444		ندن
	717	LE: H2-BROMINE FUEL CELL SYSTEM	SFACE TE	ST HARD	MARE				
		SCEING HARDWARE SUBSYSTEM HO							
		DES	IGN D	EV SHOP	5	.F.L.	a.c.		
	81	TOTAL FUEL CELL SYSTEM-S S	448	1534		7584	1438		
	82	ELECTRONICS	448 13	4		528	94		
		BOEING SUBTOTAL - 5					1532		
		. на	RDWARE A	SSEMBLY	1-C/0		1762		
		SOEING SUPPORT HOURS							
	30	STEM ENGINEERING & INTEGRATION OFTWARE ENGINEERING	567 144						
	31	STEMS GROUND TEST CONDUCT	341						
	31	STERS FLIGHT TEST CONDUCT	47	0					
	Si	IPPORT EQUIPHENT DESIGN	47	0					
		OLING & SPECIAL TEST EQUIPMENT	147						
	41	AISON ENGINEERING	107	7					
		TA GGRAM MANAGEMENT (ENG)	212	T					
	FF	OGRAM MANAGEMENT (ENG) OGRAM MANAGEMENT (MFG)	197						
		* BOEING DESIGN 1 DESIGN 1 DESIGN 1 DESIGN 1 DESIGN 2 DESIGN SUPPORT HOLE	EV SHOP	******** HOURS	******		7000 ± 13500 ± 23700 ±		
		***************				14.	*		
		*** PCH MODEL REVISION NIM							
	***	++++++++++++++++++++++++++++++++++++++	Y IN MIL	1083	***	******	*******		
	111	LE: H2-BROWINE FUEL CELL SYSTEM	SPACE TE	ST MARDW	ARE				
						IPMENT.			
				E	NGR.	HARD	WARE		
	н.	ALMARE SUBSYSTEM COST (SH)							
		B1 TOTAL FUEL CELL SYSTEM-STRUC			0.482	1	.313		
		PC ELECTRONICS			0.001	0	.085		
		SUBSYSTEM HARDWARE SUBTOTAL (•M)		0.483				
	GF	E/SUBCON/GIVEN COST (+H)							
					0.0		.0		
		SUBCON/GIVEN (31-350) SUBTOTA	L (#M)		0.0				
		HARDWARE ASSEMBLY 1 C/O				3	.211		
		HARDWARE SUBTOTAL (SH)							
	ŝi.	FFORT COST (M) SYSTEM ENGINEERING & INTEGRATION			5.345				
		SOFTWARE ENGINEERING			0.117				
		SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT			0.276				
		PECULIAR SUPPORT EQUIPMENT			0.033		.049		
		TOOLING & SPECIAL TEST EQUIPMENT				-	.177		
		LIAISON ENGINEERING			0.025	Ŷ			
		DATA FROGRAM MANAGEMENT			5.127				
					· · · · · · · · · · · · · · · · · · ·				
		SUPPORT EFFORT SUBTOTAL (\$m)			101		.540		
		TATAL CAME CHARTER OF THE P			4 10 14				

TOTAL (SM) (NOMINAL SCHEDULE)

PAYLOAD ELEMENT HAME TON THRUSTER EFFECT ON LEO POWER CODE BACX2012	TYPE Science and Applications (Non-comm.)				
CONTACT Name CAROLYN PORVIS Address NASA-LEWIS RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 11				
Telephone 216 433-4000 X52	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital				
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Scale = 4				
Desired First Flight, Year: 1998 Number of Flights 1 Duration	of Flight, Days 90				
OBJECTIVE TO OBTAIN ESSENTIAL KNOWLEDGE ON POWER SYSTEMS OPERATING IN AN ION THRUSTER GENERATED PLASMA PLUME WHICH IS MEEDED FOR DESIGN AND DEVELOPMENT OF ADVANCED PHOTOVOLTAIC SPACE POWER SYSTEM WITH HIGH POWER AND HIGH VOLTAGE.					
DESCRIPTION PROTOTYPE OF ADVANCED PHOTOVOLTAIC SPACE POWER SYSTEMS MUST BE OPERATED IN THE VICINITY IN ORDER TO GAIN ESSENTIAL EXPERIMENTAL DATA. THIS DATA WILL BE ANALYZED TO YIELD BASIC PHYSICAL PROCESSES AND ULTINATELY VERIFICATION OF ANALYTICAL MODELS AND PRACTICAL POWER THE EFFECTS OF BOTH MATURAL PLASMA ENVIRONMENT AND ION ENGINE GENERATED PLASMA ENVIRONMENT DETERMINED POWER LOSSES, ARRAY DEGRADATION AND ELECTROMAGNETIC INTERFERENCE ARE OF MAJO BE CAREFULLY CONTROLLED. DATA MUST BE OBTAINED FOR A VARIETY OF THRUSTER PROPELLANTS AN TYPE, SIZE AND VOLTAGE SCALING. BOTH PLASMA AND CONCENTRATOR SOLAR ARRAYS MUST BE ANALYZED AND TESTED INCLUDING THE EFF INCORPORATING MITIGATION TECHNIQUES SUCH AS INSULATING AND BIASING.	C KNOWLEDGE ABOUT THE R SYSTEM DESIGNS. MENT MUST BE OR CONCERN AND MUST ON USEFUL FOR ARRAY FECT OF MODIFICATIONS				
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, deg 28.5 Hodal Angle, deg Escape dV Required, m/s	Q PA				
POINTING/ORIENTATION View Direction () Inertial (X) Solar () Earth () Any Truth Sites (if known) Pointing Accuracy, arc-sec Field of View (deg) Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)					
POWER () AC () DC Power, U Duration, Hrs/Day Operating Standby () Continuous					
Peak Voltage, V Frequency, Hz					

The state of the same of the s

{ } Exte	rnal								
U, m: Um: 112	1.00 1.00 1.00	II II R	, m: , m: eturn ma	ssurized 1.00 1.00 ss, kg:	Stowed Deploye	ed			OF POOR
sk Assignm	nents								PAGE IS
Skill	112	13	114	17	18	19	1 10		E M
Level	3	1 3	1 3	13	13	13	1		く 個
Hours/Day	1	1			1	1	1		
ason DEPI	OYHENT			Hours/EVA	A 120				
	tivity, (g sk Assignm Skill Level Bours/Day ason DEPI Interval Returnal	tivity, (g) sk Assignments Skill 12 Level 3 Hours/Day ason DEPLOYHENT Interval, days Returnables, kg	112 R tivity, (g) min: sk Assignments Skill 12 13 Level 3 3 Hours/Day	### Return ma tivity, (g)	Return mass, kg: tivity, (g) min: 0.00E+00 max	Return mass, kg:	Return mass, kg:	Return mass, kg:	Return mass, kg:

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Boeing-Specific Input Data
                                                           OPS CODE
MISSION TYPE
    Free Flyer
         llot Serviced
         Renote THS
Renote Hanned
                                                               FT
         Serviced at Station (THS Retrieved)
                                                               FST
    (X) Serviced at Station (Self-propelled)
                                                               FS
    Platform Based
( ) Not Serviced
                                                               PT
         Remote TilS
        Remote Manned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                               PM
PST
                                                               PS
   Other
Space Station Based
Sortie
                                                               SS
                                                               SOR
                                                                                                                                                       OF POOR QUALITY
CONSTRUCTION/SERVICING COMPLEXITY
    (X) Low
Redium
() High
Operations Times
    OTV Up/Down
                                            0 days
                                           0 days
90 days/year
2 man-days/year
    OTV or THS on Orbit
Mission Use
IVA Service
    EVA Service
                                          20 man-days/year
    Experiment Ops
                                               man-days/year
                                          30
    Service Frequency
                                               times/year
Delta Velocities
   Up
Down
    Aero Return
Support Equipment
                                                                                                                                      (Stowed)
(Deployed)
                                                                                                Height:
                                                                                                                       meters
                 Length:
Length:
                                       meters
                                                                              meters
                                       meters
                                                                              meters
                                                                                                                       meters
                              200
                 Mass:
                                       kg
Manifest Restrictions
    (X) No Restrictions
    Only with compatible payloads
Fly-Alone
Hust have Docking Module
Length of Beam Fab
Humber of Appendages
Bumber of Hodules Required to Assemble the Payload
```

......

ION THRUSTER EFFECT ON LEO POWER 2012

EVA
Lock Ion thruster
Activate lights
Activate remote TV
Survey work area with RTV
Gather tools
Assemble solar array
Mount solar array near ion thruster
Cable up solar array
Record power output measurements for solar array
Activate recording devices
Stow tools
Deactivate RTV
Deactivate lights

ELECTRONIC TIER

			1 to 4 : 4:11			
IntE 4-MAN	R-63	FIME 1		7 ILEA	Ant: REID:	.5A:
. " IMRUSTER EFFEC	T SN LEG PO	WER				
		10411	uffiner	250.00	SODE	
HOTOTYPE GUANTIT	7 3.0		VOLUMI:			
-1.USRAM -1037(# 1000) DE	VELOPMENT	86.21	5051554	TOTAL	****
LIGINEERING						
DRAFTING		371.			2 '	1.
1231GH		1208.			100	
SYSTEMS		220.				
FROJECT MONT		498.			35	
DATA		81.				1.
SUBTOTALIEN	(G)	2578.			257	3
HANUFACTURING						
PRODUCTION						
FROTOTYPE		1272.			127	-
. GOL-TEST EQ		740.			74	
SUBTOTAL (MF	(0)	2012.			201	
IDTAL COST		4589.			438	7.
DESIGN FACTORS	ELECTRONIC	MECHANICAL	28600	AT DESCRI	STORN	
WEIGHT DENSITY	5.0004	245.000		INEER BOD	COMPLEXITY	0.300
DEMEITY	42.300	9.0744		707 FE 30		1
HEG. COMPLEXITY	10.357	7.133			LE FACTOR	.2200
NEW DESIGN	0.100	0.700	ELF	LT VOL FR	ACTION	.0041
DESIGN REPEAT	0.000	0.000		IFSRM		2.300
EQUIPMENT CLASS		*****		A OF TECH		17874
INTEGRATION LEVEL	0.0	0.0		inelLif?		1.0
				FIFTER	r ne . va	10 14104
ICHEDULE	START	FI	RST ITEm		FINILH	
DEVELOPMENT	JAN 87	11) (3)	V 674 .	111	SEF 38*	(21)
OFFLEMENTAL INFORM	MCITA					
ANE OF ECONOMICS	198	4	. 10011	14 4 77 06	LE: FACTOR	
ESCALATION	0.0	0			1301:40	
DEV COST MULTIPLE	ER 1.1	4				
GGT RANGES	DEVE	LOPHEHT	FROSU	citte	TOTAL 30	DET
7828		4019.			4617	
CENTER		4539.			1589	
14		5266.			5200	

PAYLOAD ELEMENT NAME CODE CREW SYSTEMS-EMESIS STATION BACK2013	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Name RICHARD KENNEDY Address JOHNSON SPACE CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital
Desired First Flight, Year: 1992 Number of Flights 1	Duration of Flight, Days 365
DESCRIPTION BY PROVISIOUING THE INITIAL CONFIGURATION WITH AN EMESIS STATION, THIS MISSION	WILL PROVIDE FOR DIRECT CREW
THVOLVEHENT UITH THE SYSTEM IN THE ACTUAL OPERATING ENVIRONMENT. OPERATION BY TELEVILATED CONDITIONS OR, IF REQUIRED, UNDER ACTUAL EMESIS CIRCUMSTANCES.	THE CREW WILL BE UNDER
	OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Hodal Angle, deg Escape dV Required, m/s	PAG QUA
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	(X) Any deg)
POWER () AC () DC Power, W Duration, Wrs/Day	
Operating 200 0.5 Standby Poak () Continuous	
Peak Voltage, V Frequency, Hz	

The same of the sa

EVA () Yes (X) No	Level	l l l l l l l l l l l l l l l l l l l	PAGE IS
CREW REQUIREMENTS Crew Size Skills (See Table B)	Task Assignments		DR QUI
EQUIPMENT PHYSICAL CHARACTERIST Location (K) Internal Equipment ID/Function L, m: 1.0 L, m: 1.0 Launch mass, Consumable Ty Acceleration	CS	ote ressurized 0.50 Stoved 0.50 Deployed mass, kg:	ORIGINAL OF PODR
THERMAL () Active (X) Passive Temperature, deg C Ope Non Ope Non Ope Non	rational Minimum -operational Minimum rational Minimum -operational Minimum	Maximum Maximum Maximum Maximum	
DATA/COMMUNICATIONS Conttoring Requirements: (X) None () Realtime () Encription/Decription Re () Uplink Required: Comman () On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Nours/Day): On-Board Storage (Nbit): Data Dump Frequency (Per Recording Rate (KBPS)	Rate (KBS): Fr Required () Digital Ho Vo Ot Orbit) Do	equency (IMz): urs/Day ice (Hours/Day): her: wnlink command rate: wnlink Frequency (IMz):	

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Boeing-Specific Input Data
                                                            OPS CODE
LISSION TYPE
    Free Flyer
         Hot Serviced
Remote THS
Remote Hanned
                                                                FII
         Serviced at Station (TMS Retrieved)
                                                                FST
      ) Serviced at Station (Self-propelled)
                                                                FS
    Platform Based
() Not Serviced
                                                                P
                                                                PT
         Remote THS
         Remote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                               PM
PST
                                                                PS
    Other
(%) Space Station Based
( ) Sortie
                                                                SS
                                                                SOR
CONSTRUCTION/SERVICING COMPLEXITY (X) Lou.
         Hedium
      ) High
Operations Times
    OTV Up/Down
                                             0 days
                                             0 days
   OTV or THS on Orbit
                                          365 days/year
4 man-days/year
    Mission Use
    IVA Service
                                               man-days/year
    EVA Service
                                             2 man-days/year
4 times/year
    Experiment Ops
   Service Frequency
Delta Velocities
   Up
   Down
Acro Return
Support Equipment
                                                                                                 Height:
                                                                                                                                      (Stowed)
(Deployed)
                 Length:
Length:
                                       meters
                                                                              meters
                                                                                                                       meters
                                                                              meters
                                       meters
                                                                                                                       meters
                 Hass:
                                       kg
Manifest Restrictions
    (X) No Restrictions
        Only with compatible payloads
Fly-Alone
fast have Docking Module
Length of Beam Fab
Humber of Appendages
Humber of Bodules Required to Assemble the Payload
```

•	-	 -	-	-	-	-	-	-	-	 -	-	-	-	j
							C	_			n	-	٠	

Name and Phone Number: C. REID 3-2020

DESCRIPTION BY PROVISIONING THE INITIAL CONFIGURATION WITH AN EMESIS STATION, THIS MISSION WILL PROVIDE FOR DIRECT CREW INVOLVEHENT WITH THE SYSTEM IN THE ACTUAL OPERATING ENVIRONMENT. OPERATION BY THE CREW WILL BE UNDER STHULATED CONDITIONS OR, IF REQUIRED, UNDER ACTUAL EMESIS CIRCUMSTANCES.

Item Dry Weight: 152 pounds Volume: 12.00 cubic feet

Structural Weight (includes typical "mechanical" items listed below): 140.00 pounds

Design Complexity: 8

Hamufacturing Complexity for Structural/Mechanical Items: 5
Typical "mechanical" items include enclosures, optics, motors, blowers, gyros, batteries, cables, connectors, switches, indicators, cathode ray tubes, antennas without electronics, mechanisms, waveguides, etc.

Electronic Equipment Description: Analog Digital 20 % Power Supplies 60 % Other 10 %

Hanufacturing Complexity for Electronic Items: 5

Weight of the Circuit Board and Electronics Mounted on it: 4.00 pounds

Material Used for the Enclosure: STAINLESS Machine Casting? No

Of the electronics weight, what % is off-the-shelf? 0

Of the sturctural weight, what % is off-the-shelf? 0

Hanufacturing Degree of Automation Electronics () Low

Electronics { } Low (X) Hedium Hechanical { } Low (X) Hedium

{ } High

Is the item Hardened? No

PAYLOAD ELEMENT NAME DISMUASHER/CLOTHES VASHER CONTACT Hame RICHARD KEMMEDY Address JOHNSON SPACE CENTER	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
Desired First Flight, Year: 1991 Number of Flights 1 Duration	of Flight, Days 365
DESCRIPTION THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE TECHNOLOGY DEVELOPMENT AND I APPLIANCES REQUIRED TO CLEANSE EATING APPARATUS AND CREW APPAREL, THIS MISSION CAN BE A LITTIAL SPACE STATION CONFIGURATION WITH THE TECHNOLOGY TRANSFERRABLE TO THE EVOLUTION.	ACCOMMODATED ON THE
CONFIGURATION.	ORIGINAL:
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, deg 28.5 Tolerance + - Rodal Angle, deg Escape dv Required, m/s	AL PAGE 19 OR QUALITY
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance) () Earth (X) Any Field of View (deg)	₹ 60
POWER () AC Power, W Operating 500 Standby Peak Voltage, V Evenue () Continuous Frequency, Hz	

DATA/COLUMNICATIONS Unitoring Requirements: (A) None (B) Realtime (C) Encription/Decription R (D) Uplink Required: Comma (D) On-Board Data Processin Description: Data Types: Data Types: Live TV (Hours/Day): On-Board Storage (Mbit) Data Dump Frequency (Pe	equired nd Rate (KBS): g Required g () Digital :	Frequency (MIz): Hours/Day Voice (Hours/Day): Other: Downlink command rate: Downlink Frequency (MIz):	
lleat Rejection, w Op	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Maximum Maximum Maximum Maximum	·
L, m: 1. Launch mass, Consumable T	(X) Pressurized 00 H, m: 1.00 00 H, m: 1.00 kg: 100 ypes	() Remote () Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Return mass, kg: 100 : 0.00E+00 max: 0.00E+00	ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size	Task Assignments		2 P
Skills (See Table B)	Skill 11	1 1 1 1 1 1 1	PAGE IS
	Level 2		7 10
	Hours/Day		
EVA () Yes (X) No	Reason	Hours/EVA	
SERVICING/IMAINTENANCE Service: Configuration Changes:	Interval, days Returnables, kg Interval, day Deliverables, kg	Consumables, kg Han hours Han/Hours Required Returnables, kg	

SPECIAL COMSIDERATIONS/See Instructions

	Вое	ing-Specific I	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote ThS () Remote Hanned () Serviced at Station (THS Ret () Serviced at Station (Self-pr	OPS CODE F FT FM rieved) FST copelled) FS					
Platform Based () Not Serviced () Remote THS () Remote Manned () Serviced at Station (TMS Ret () Serviced at Station (Self-pr	P PT PH PST opelled) PS					
Other (X) Space Station Based (Sortie	SS					•
CONSTRUCTION/SERVICING COMPLEXITY Low Hedium High						ORIGIN OF POO
OTV or THS on Orbit Mission Use TVA Service EVA Service Experiment Ops	days days days/year nan-days/year man-days/year man-days/year times/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return						
Support Equipment Length: meter Length: meter		meters meters	Height: Height:	meters meters	(Stowed) (Deployed)	
liass: kg						
Manifest Restrictions (X) No Restrictions () Only with compatible payload () Fly-Alone () Must have Docking Module	ls					
Length of Beam Fab Number of Appendages Number of Nodules Required to Assem	ble the Payload					

	Cost Data	
Hanae and Phone Number: G. REID 3-2	020	
APPLIANCES REQUIRED TO CLEANSE FATT	TIONS NECESSARY FOR THE TECHNOLOGY DEVELOPMENT AND DEMONSTRATION OF THE APPARATUS AND CREW APPAREL. THIS MISSION CAN BE ACCOMMODATED ON THE WITH THE TECHNOLOGY TRANSFERRABLE TO THE EVOLUTIONARY GROWTH	Е
Item Dry Veight: 400 pounds Structural Veight (includes typical	Volume: 20.00 cubic feet "mechanical" items listed below): pounds	•
Design Complexity: 4	mechanical items listed below). pounds	
Manufacturing Complexity for Struct Typical "mechanical" items inclu- cables, connectors, switches, in mechanisms, waveguides, etc.	ural/Nechanical Items: 4 de enclosures, optics, motors, blowers, gyros, batteries, dicators, cathode ray tubes, antennas without electronics,	OR
Electronic Equipment Description:	Analog 10 % Digital % Power Supplies 90 % Other %	OF POOR
Hanufacturing Complexity for Election	onic Items: 4	PAG AU
Weight of the Circuit Board and Ele Material Used for the Enclosure: Si Of the electronics weight, what %	CAINLESS Machine Casting? NO	PAGE 18

Of the sturctural weight, what % is off-the-shelf? 50

Hanufacturing Degree of Automation
Electronics
Hechanical

(X) Medium

{ } High

Is the item Hardened? No

--- PRICE 64 ---

DATE 4-MAR-83

TIME 10:47 (283010) FILENAME: REID. DAT

DISHWASHER/CLOTHES WASHER

		UNIT	WEIGHT	400.00	MODE	1
PROTOTYPE QUANTITY	3.000	TINU	VOLUME	20.00	QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELO	PMENT	PRO	DUCTION	TOTAL COST	
ENGINEERING						
DRAFTING	1	49.		-	149.	
DESIGN		54.		-	454.	
SYSTEMS		54.		-	54.	
PROJECT MGMT	3	10.		-	310.	
₫ DATA		36.		-	36.	
SUBTOTAL (ENG)	10	03.		-	1003.	
MANUFACTURING						
PRODUCTION		-		-		
FROTOTYFE	5	43.		-	543.	
TOOL-TEST EQ	3	39.			339.	
SUBTOTAL (MFG)	8	82.			882.	
TOTAL COST	18	85.			1885.	

OF POOR QUALITY

PAYLOAD ELEGERT I	(ALD):	CODE		TYPE	
CONTACT Name THOMAS	IOLOGY LABUS LEUTS RESEARCH CI	BACX2018		() Science and Applicatio () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A)	
Telephone				Importance of the Space St this Element	ation to
STATUS () Operational	() Approved	() Planned () Candid	ate (X) Opportunity	l = Low Value, But Could 10 = Vital Scale = 9	
Desired First Fli	ight, Year: 199	5 Number of Fligh	ts 1 Duration	of Flight, Days 90	
TO PROVIDE THE TITLE CONTROL OF CO	ECHNOLOGY BASE FO	R THE EXTINGUISHHENT OF F	TRES AND FOR		
THIS HISSION VILI OF COLEUSION PROC INTERACTION BETWI TRANSFER AND CHES SHOULD BE CONDUCT	CESSES IN CONFINI CEN A NUMBER OF C TICAL KINETICS. S TED TO DETERMINE	D ENVIRONMENTS. IN-SPACE OUPLEX PHYSICAL DISCIPLIN PECIFIC TECHNOLOGY EXPERI THE COURSESTION HECKALISMS	THE EXTINGUISHMENT OF FIRES COMBUSTION TECHNOLOGY EXPERIES SUCH AS HEAT TRANSFER, FLUENTS TO DETERMINE THE EFFECT OF SOLID, LIQUID AND GASEOUS IN THE AREA OF FIRE SAFETY TOOGY DEVELOPMENT LABORATORY FOR	MENTS INVOLVE THE UID HECHANICS, MASS IS OF LOW-GRAVITY S SYSTEMS.	ORIGINAL OF POOR
ORBIT CHARACTERIS Geosynchronous Apogee, km Inclination, of Hodal Angle, of Escape dV Requ	50 leg 28.	O Perigee, km 500	Tolerance + - Tolerance + - Ephemeris Accuracy, m		PAGE 18
POINTING/ORIENTATE View Direction Truth Sites (in Pointing Accurate Stabi Special Restricts	f known)	() Inertial () Solar	() Earth (X) Any Field of View (deg)		
POWER (X) AC	(X) DC Power, W	Duration, Hrs/Day			
Operating Standby Peak Voltage, V	500 50	8.00	() Continuous		

CATA/COMMUNICATIONS Liouitoring Requirements: () Hone (X) Realtime () Encription/Decription Re () Uplink Required: Comman	outred	0 Other:	Frequency (1)	llz): 0.00			
(X) Uplink Required: Comman On-Board Data Processing Description:	Required						
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	(X) Digital		Hours/Day Voice (Hours Other:	/Day): 0.00			
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit) 0 0.00		Downlink com Downlink Fre	mand rate: quency (Mz):	0.00		
THERNAL (X) Active () Passive Temperature, deg C Ope Non Heat Rejection, w Ope Non	rational Minimum -operational Minim rational Minimum -operational Minim	nura 0	Maximum Maximum Maximum Maximum	8			
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Platform Based () Not Serviced () Remote TMS () Remote Hanned () Serviced at Station (TMS Retrieved) () Serviced at Station (Self-propelled)	P PT PM PST PS					
Other (X) Space Station Based Sortie	SS SOR					
CONSTRUCTION/SERVICING COMPLEXITY Low						OF I
Operations Times OTV Up/Down OTV or TMS on Orbit Mission Use IVA Service EVA Service Experiment Ops Service Frequency Odays Odays Odays Odays/year For index Odays Odays Odays/year Odays/year Odays/ Odays	year vear					OF POOR QUALITY
Delta Velocities Up Down Aero Return 0.00 0.00						
Support Equipment Length: 0.00 meters Wide Length: 0.00 meters Wide	dth: dth:	0.00 meters 0.00 meters	Height: Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	
Hass: 0 kg						
Hanifest Restrictions (X) No Restrictions () Only with compatible payloads () Fly-Alone () Hust have Docking Module						
Length of Beam Fab Humber of Appendages Humber of Modules Required to Assemble the Pay	yload	0.00				

(0)

EVA

Activate lights
Activate remote TV
Scan work area with RTV
Gather tools and supplies
Translate to fire safety pallet
Turn on fire safety electronics and TV
Verify electronics and TV operational
Place sample in container

Solid

Liquid

Gaseous

Conduct experiment

Check data

Stow tools and samples

Scan work area with RTV

Deactivate RTV

Deactivate lights

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TY SPACEIS FCHOUT
START S
  REVISION NINE (15 FEBRUARY 1982)
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 M4 PLUMBING 50 4 1 0 50
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ORIGINAL PAGE 19 OF POOR QUALITY

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PAYLOAD ELEMENT MAKE CODE TETHER DYNAMICS TECHNOLOGY BACK2019	TYPE () Science and Applications (Non-comm.) () Commercial
COUTACT Uning A. POTTER	(X) Technology Development () Operations
Mane A. POTTER Address HASA-JOHNSON SPACE CENTER	() Other () National Security
	Type number (see table A) 15
W. Lanbana	Importance of the Space Station to
Telephone	- 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 1
Desired First Flight, Year: 2003 Number of Flights 1 Duration	on of Flight, Days 90
OEJECTIVE TO PROVIDE A TECHNOLOGY DEVELOPMENT BASE FOR APPLICATIONS OF LONG TETHERS ATTACHED TO ORBITING SPACECRAFT.	
DESCRIPTION THE HISSIONS PROPOSED WILL PROVIDE THE TECHNOLOGY NEEDED FOR SUCCESSFUL DEPLOYMENT, OR ETRIEVAL OF LONG TETHERS FROM ORBITING SPACECRAFT AND THE USE OF ELECTRODYNAMIC FOR FOR CONTROL OF THE TETHER AND GENERATION OF THRUST AND DRAG. AN EXPERIMENTAL TETHER AUTLL BE DEPLOYED, AND ITS DYNAMIC RESPONSE TO HECHANICAL AND ELECTRODYNAMIC FORCES WILL	CES ON CONDUCTING TETHER TO O
AND COMPARED WITH THEORY.	LL BE HEASURED
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ORBIT CHARACTERISTICS	PAGE IS
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Ferigee, km 500 Tolerance +	
Inclination, deg 28.5 Tolerance + Ephemeris Accuracy, m Escape dV Required, m/s	
POINTING/ORIENTATION View Direction Truth Sites (if known) () Inertial () Solar (X) Earth () Any	
Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POVER (V) DC	
() AC (X) DC Power, W Duration, Hrs/Day	
Operating 1000 16.00	
Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, liz 0	
Voltage, V 0 Frequency, Hz 0	

DATA/COLEMBICATION: Liouitoring Required from the Color of the Color o	Decription ired: Conta Proces: () Ant): urs/Day): orage (Hb) requency	it): (Per Orbit)	(KBS): ed) Digita 0 0 0 0 0 0 0 0 0	0	cuer.	Noice Other:	(Hours/E	Oay): 0		0		
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SPECIAL COMSIDERATIONS/See Instructions

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Boeing-Specific Input Data
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FII
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Serviced at Station (Self-propelled)
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                                                                  FS
    Platform Based
       ) Hot Serviced
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         Remote THS
                                                                   PT
      Remote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
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PST
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      ) High
Operations Times
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                                                  days
                                                 days/year
man-days/year
man-days/year
    Mission Use
    IVA Service
    EVA Service
    Experiment Ops
                                                 man-days/year
                                            10
    Service Frequency
                                                 times/year
Delta Velocities
                                  0.00
    Up
    Down
    Aero Return
Support Equipment
                                  0.00 meters
0.00 meters
                                                                           0.00 meters
0.00 meters
                                                                                                                                            (Stowed)
(Deployed)
                  Length:
Length:
                                                           Width:
                                                                                                                      0.00 meters
0.00 meters
                                       0 kg
                  llass:
L'anifest Restrictions
    (X) No Restrictions
      Only with compatible payloads
Fly-Alone
Hust have Docking Module
                                                                            0.00
Length of Lean Fab
Humber of Appendages
Humber of Modules Required to Assemble the Payload
```

PAYLOAD ELELENT HAME CODE LARGE SPACE POWER SYSTEM TECH BACX2020	TYPE () Science and Applications (Non-comm.) () Commercial
CONTACT Came MARTIN VALGORA Address MASA-LEWIS RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 11
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	l = Low Value, But Could Use 10 = Vital Scale = 8
Desired First Flight, Year: 1995 Number of Flights 0 Duration	of Flight, Days 90
DESCRIPTION A LARCE SOLAR ARRAY SECHENT (SIZED UP TO 20 KU) WILL BE ASSEMBLED IN MODULAR FORM CAPAN POWER AT VARIOUS VOLTAGES FROM 200 TO 1000 VOLTS. THIS POWER WILL BE BROUGHT INTO A CONTITUILL BE CONVERTED TO AC (HIGH FREQUENCY) FOR TRANSMISSION TO A POWER DISTRIBUTOR SYSTEM WILL BE OVER SEVERAL LINES. WITHIN THE POWER DISTRIBUTOR, THE POWER USERS (POSSIBLY 120V, 60 CYCLE).	VILL BE CONDITIONED
CREIT CHARACTERISTICS. Geosynchronous Orbit () Yes (K) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, deg 28.5 Hodal Angle, deg Escape dv Required, m/s . Ephemeris Accuracy, m	QUALITY
POINTING/ORIENTATION View Direction () Inertial (X) Solar () Earth () Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POWER () DC Power, U Duration, Hrs/Day	
Operating 0 0.00 Standby 0 0.00 () Continuous Peak Voltage, V 0 Frequency, Hz 0	

NASA Januaryan Managaran					
DATA/COLUMNICATIONS Liouitoring Requirements: (X) Realtime	() Offline () Other:				
() Encription/Decription Red () Uplink Required: Comman (%) On-Board Data Processing Description:	uuired	Frequency (13)	z):		
Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	(X) Digital	Hours/Day Voice (Hours/ Other:			
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit)	Downlink common Downlink Freq			
THERMAL (X) Active () Passive Temperature, deg C Oper Non- Non- Nest Rejection, w Oper	rational Minimum (-operational Minimum rational Minimum -operational Minimum) Haximum Haximum Maximum Haximum	60		
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 9.00 L, m: 16.00 Launch mass, Consumable Ty Acceleration	() Pressurized 0	() Remote (X) Unpressurized H, m: 2.61 H, m: 1.00 Return mass, kg: : 0.00E+00 max	Stowed Deployed 0.6 : 0.00E+00		ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size 1	Task Assignments				PAGE IS
Skills (See Table B)	Skill 5 11	1 1	1 1, 1		3 10
	Level 3 2	. 1 1	1 1 1		
	Hours/Day 2				
EVA (X) Yes () No	Reason INSTALLATION ON	S.S. Hours/EV	A 120		
SERVICIES/EATHTEHANCE Service:	Interval, days Returnables, kg	0	Consumables, kg Man hours	0.00	
Configuration Changes:	Interval, day Deliverables, kg	0	Man/Hours Required Returnables, kg	0.00	

SPECIAL CONSIDERATIONS/See Instructions

		I	oeing-Specific I	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote TMS () Remote Hanned () Serviced at Stat () Serviced at Stat	ion (THS Retrieve	OPS CODE F FT FII ed) FST led) FS					
Platform Based () Hot Serviced () Remote TLS () Remote Hanned () Serviced at Stat () Serviced at Stat	ioa (TMS Retrieve ion (Self-propell	P PT PM ed) PST led) PS					
Other {X} Space Station Ba {} Sortie	ised	SS SOR					
CONSTRUCTION/SERVICING Low K Hedium High	COMPLEXITY						OF F
Operations Times OTV Up/Dovm OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	20 man-	s/year days/year days/year days/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return	8:88						
Support Equipment Length: Length:	1.00 meters 0.00 meters	Vidth:	0.50 meters	Height: Height:	0.50 meters	(Stowed) (Deployed)	
liass:	200 kg						
Manifest Restrictions (%) No Restrictions () Only with compate () Fly-Alone () Rust have Docking	ible payloads						
Length of Beam Fab Humber of Appendages Humber of Hodules Requi		de Deuleed	0.00				

. 10)9/

LARGE SPACE POWER SYSTEM TECHNOLOGY 2020

Deactivate lights

EVA Activate lights Activate remote TV Scan work and storage area Setup solar array assembly area Activate RMS and translate to array storage area Align RMS with array module Secure RMS to array module Release array module from storage area Translate array module to assembly area Position array module on assembly fixture Attach array module to assembly fixture Release RMS Translate back to storage area Align RMS with 2nd module Secure 2nd module to RMS Release module from storage area Translate module to assembly fixture Align 2nd module with 1st module and fixture Secure 2nd module to 1st module Release RMS Continue until solar array completed Translate RMS to solar array handling point and secure Release solar array from assembly fixture Deploy solar array Secure solar array to boom Release and stow RMS Mate cables to power distribution system Check connections and mounting of solar array Point array Turn on power distribution system Run distribution tests Stow tools Scan work and storage area with RTV Deactivate RTV

ORIGINAL PAGE IS

TY SPACETO POSCHOUT

START S

REVISION NINE (15 FEBRUARY 1982)

CASE LARGE SPACE POWER SYSTEM TECH
DWRAP 60 95 130 50 120 60 30 15
REMOTE 0 0
ASUFPORT 1.0 .3 1 1
PSUFFORT 1.2 1 1 1
WEIGHT 0 0 60 2660
SCHEDULE 0 0
FINAL 1 0
FLIGHT 0 0
FLIGHT 0 0
FOOLING 1
SPARES 10
SETS 1
CLASS 0
DEV

*** PCM MODEL REVISION NINE

22 FEB 1983 ***

		DESIGN I	EV SHOP	DES & SHOP DOLLARS	SUB/SFE TOTAL DGLLARS
31	STRUCTURE				
47	SOLAR PANELS 1900 5 0 60				
		72233.	21670.	:392386.	
H7	FRAME 700 5 0 50				
		30444.	7133.	2474287.	
XII	INTEG & TEST 0 5 0 0				
	ELECTRICAL SYSTEM	14548.	4963.	1464537.	
E4	FOWER CONDITIONING SO 5 0 60				
		2967.	890.	262582.	
	INTEG & TEST 0 5 0 0				
		317.	156.	45939.	
Eirl of 3					

*** FCM MODEL REVISION NINE

22 FEB 1983 ***

MANUFACTURING **** MANUFACTURING *** MANUFACTURING **** MANUFACTURING

		8.F.L.		MANUFACTUR	SUB/OFE TOTAL
		HOURS	HOURS	DOLLARS	DOLLARS
21	STRUCTURE				
1.7	SOLAR FANELE 1900 5 3 0 50				
		206527.	30977.	28397504.	
117	FRAME 700 5 3 0 40				
		31751.	4765.	4347561.	
Sinc	ASSY 1 0/0 0 5 0 0				
		19988.	2776.	2748343.	
.2	ELECTRICAL SYSTEM				
1+	FOWER CONDITIONING SO 3 3 0 60				
		2271.	13:1.	1174830.	
. 1111	A397 1 C/2 5 4 0 5				
_ t		210.	11.	lialal.	
	*** PCM NODEL REVISION N	12	21 - 28 :	4:2 ***	

14. ACETHIRDS 240 41 FOR HOUSE COMMON V. SE V. V. FOR STREET COMMON V.

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15.384

10 mm 18 . mo + + m 2

TOTAL (SM) (NOMINAL SCHEDULE)

ORIGINAL PAGE IS

+ -

PAYLOAD ELEMENT MADE LOW COST HODULAR SOLAR PANEL TEC BACK2024 CONTACT	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development			
Hane D.H. SUDDETH Address LUTHER U. SLIFER GODDARD	() Operations () Other () National Security Type number (see table A) 11			
Telephone	Importance of the Space Station to this Elewent			
STATUS () Operational () Approved () Planned () Candidate (%) Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 0			
Desired First Flight, Year: 1995 Number of Flights 1 Duration of	of Flight, Days 0			
OEJECTIVE DEVELOP LOU COST SGLAR PANELS.				
DESCRIPTION THIS KISSION WOULD PROVIDE TESTING AND DEMONSTRATING OF THE TECHNOLOGY FOR DESIGN AND RECOST SOLAR PANELS. THEIR COSTS WOULD BE GREATLY REDUCED BY THE USE OF DESIGN FEATURES SOLAR PANELS. THEIR COSTS WOULD BE GREATLY REDUCED BY THE USE OF DESIGN FEATURES SOLAR PANELS. THEIR COSTS WOULD BE GREATLY REDUCED BY THE USE OF DESIGN FEATURES SOLAR PRODUCTION OF RELIABLE EARTH-THE SPACE STATION MAKES POSSIBLE THE CONTINUOUS, LONG-TERM TEST IN PARALLEL OF SEVERAL AND POWER SYSTEM DESIGNS, IN REAL CONDITIONS. IT MAKES AVAILABLE THE SPACE VACUUM, THE ENVIRONMENT AND THE THERMAL CYCLING OF CONTINUOUS, FREQUENT ORBITAL ECLIPSES. THE THERMAL PANELS MUST EMDURE IS ONE OF THE MOST IMPORTANT AND LEAST UNDERSTOOD CAUSES OF SOLAR PANELS MUST EMDURE IS ONE OF THE MOST IMPORTANT AND LEAST UNDERSTOOD CAUSES OF SOLAR PANELS MUST WOULD ALLOW US TO UNDERSTAND THE CAUSES OF THESE FAILURES.	BUITABLE FOR SPACE, -BASED SOLAR PANELS. CANDIDATE SOLAR PANEL ORBITAL RADIATION			
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Inclination, deg 0.0 Ephemeris Accuracy, m Escape dv Required, m/s 0.0	ALITY S			
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg) (0.00			
POWER (X) AC (X) DC Power, W Duration, Hrs/Day				
Operating 0 0.00 (X) Continuous Peak 0 0.00 (X) Continuous Voltage, V 0 Frequency, Hz 0				

Conitoring Requirements: () None () Realtime () Encription/Decription R () Uplink Required: Comma () On-Board Data Processin Description: Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit) Data Dump Frequency (Pe	Required (KBS): og Required og () Digital og 0 0: 0:00	() Oth O	er:	Frequency (E. Hours/Day Voice (Hours Other:	0 (Day): 0	.00	0		
Recording Rate (KBPS)	0.00			Downlink Fre	equency (1111	z): (.00		
Heat Rejection, v Op	perational Minimum on-operational Min perational Minimum on-operational Min	inum	8	Haxinum Haxinum Haxinum Haxinum	8				
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration	(X) Press 60 W, m: 60 W, m: kg: 9 ypes Sensitivity, (g)	0.45 0.45	II, m Rétui	Remote Unpressurized : 0.15 : 0.15 rn wass, kg:	Stoved Deployed				ORIGIN/
Equipment ID/Function L, m: L, m: Launch mass; Consumable T Acceleration REU REQUIREMENTS Crew Size 0	(X) Press 60 V, m: 60 V, m: kg: ypes Sensitivity, (g) Task Assignment	0.45 0.45	H, m II, m Return	: 0.15 : 0.15 cn wass, kg:	Stoved Deployed		 		ORIGINAL OF POOR
Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration	(X) Press 60 W, m: 60 W, m: kg: 9: Sensitivity, (g) Task Assignme	0.45 0.45 ents	in: 0.0	: 0.15 : 0.15 cn wass, kg:	Stoved Deployed		 - <u>-</u>		ORIGINAL PA
Equipment ID/Function L, m: L, m: Launch mass; Consumable T Acceleration REW REQUIREMENTS Crew Size 0	(X) Press 60 W, m: 60 W, m: kg: Sypes Sensitivity, (g) Task Assignme	0.45 0.45 ents	H, m II, m Return	: 0.15 : 0.15 cn wass, kg:	Stoved Deployed				ORIGINAL PAGE OF POOR QUAL
Equipment ID/Function L, m: L, m: Launch mass; Consumable T Acceleration REU REQUIREMENTS Crew Size 0	(X) Press 60 W, m: 60 W, m: kg: 9: Sensitivity, (g) Task Assignme	0.45 0.45 ents	in: 0.0	: 0.15 : 0.15 cn wass, kg:	Stoved Deployed				ORIGINAL PAGE IS
L, m: L, m: L, m: Launch mass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0	(X) Press 60 W, m: 60 W, m: kg: Sypes Sensitivity, (g) Task Assignme	0.45 0.45 ents	in: 0.0	: 0.15 : 0.15 cn wass, kg:	Stoved Deployed	1 1	 		ORIGINAL PAGE IS
Equipment ID/Function L, m: L, m: Launch mass; Consumable T Acceleration REW REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Press 60 V, m: 60 V, m: kg: ypes Sensitivity, (g) Task Assignme Skill Level Hours/Day	0.45 0.45 ents 9 1	in: 0.0	: 0.15 0.15 сп wass, kg: 00E+00 ma	Stoved Dep18yed	1 1		0	ORIGINAL PAGE IS

SPECIAL CONSIDERATIONS/See Instructions

```
Boeing-Specific Input Data
                                                             OPS CODE
HISSION TYPE
   Free Flyer
        Not Serviced
         Remote THS
Remote Hanned
                                                                 FT
    ( ) Serviced at Station (THS Retrieved)
( ) Serviced at Station (Self-propelled)
                                                                 FST
                                                                 FS
    Platform Based
( ) Not Serviced
                                                                 P
         Remote THS
                                                                 PT
         Remote Named
Serviced at Station (TNS Retrieved)
Serviced at Station (Self-propelled)
                                                                 PH
PST
                                                                 PS
   Other
(X) Space Station Based
(X) Sortie
                                                                 SS
                                                                                                                                                                  OF POOR
CONSTRUCTION/SERVICING COMPLEXITY
    XX Lou
    ( ) Hedium
( ) High
                                                                                                                                                                  QUALITY.
Operations Times
    OTV Up/Down
                                              0 days
                                            0 days
90 days/year
2 man-days/year
8 man-days/year
    OTV or THS on Orbit
    Mission Use
IVA Service
    EVA Service
    Experiment Ops
                                             90 man-days/year
    Service Frequency
                                              3 times/year
Delta Velocities
                                 0.00
    Up
                                 0.00
    Down
    Aero Return
Support Equipment
                 Length:
Length:
                                3.00 meters
12.00 meters
                                                                                                                     .50 meters
.10 meters
                                                                                                                                         (Stoved)
(Deployed)
                                                                           .50 meters
                                   100 kg
                 liass:
Hanifest Restrictions
    (X) No Restrictions
         Only with compatible payloads
    Fly-Alone Docking Hodule
Length of Bean Fab
                                                                           0.00
Humber of Appendages
Humber of Hodules Required to Assemble the Payload
```

LOW COST MODULAR SOLAR PANEL TECHNOLOGY 2024

EVA Activate lights Activate Remote TV Scan storage and work area with RTV Gather tools Prepare solar panel assembly area Activate RMS Translate to solar panel module #1 Attach to module 1 Release module 1 from storage restraints Translate module 1 to assembly area Position and secure module 1 to assembly fixture Release RMS Prepare module 1 for assembly Translate RMS to module 2 and secure Release module 2 from packaging restraints Translate module 2 to assembly fixture Align module 2 with module 1 and assembly fixture Secure module 2 to fixture Release RMS Connect module 2 to module 1 Continue as above until solar array assembled Checkout mechanical and electrical connections Secure RMS to solar array Release solar array from assembly fixture Translate solar array to boom Attach solar array to boom Release and stow RMS Complete mechanical and electrical connections Checkout mechanical data and electrical connections Check operation of solar array Stow assembly fixture Stow tools

Scan assembly area with RTV Deactivate RTV Deactivate lights

```
START 5
  REVISION NINE (15 FEBRUARY 1982)
CASE MODULAR SOLAR PANEL (SS TEST HARDWARE)
BURAF 60 95 130 50 120 60 30 15
REMOTE 0 0
RSUPPORT 1 .2 1 1 1 WEIGHT 0 0 5 20
SCHEDULE 0 0
FINAL 1 0
FLIGHT 0 0
TOOLING 1
SETS 1
CLASS 0
DEV
                                          22 FEB 1983 ***
          *** FCM MODEL REVISION NINE
****** BOEING ***** SUB/OFE
                                   DESIGN DEV SHOP DES & SHOP
                                                                 TOTAL
                                   HOURS HOURS DOLLARS
                                                                DOLLARS
81 STRUCTURE
X7 SOLAR PANELS 13 5 0 5
                                      3071.
                                                927.
                                                        273554.
M7 FRAME 5 5 0 5
                                     1034.
                                                         91479.
                                                310.
XIT INTEG & TEST 0 5 0 0
                                                199.
                                                         58833.
M2 ELECTRICAL SYSTEM
E4 POWER CONDITIONING 2 S 0 50
                                      228.
                                                03.
                                                       20183.
EIT INTEG & TEST & S & O
                                      40.
                                                 12.
                                                         3528.
```

TY SPACE? FCMOIUTEGOUT

END

******* 50EING ******* SUB/OFE B.F.L. G.C. MANUFACTUR MOURS HOURS DOLLARS TOTAL DOLLARS SOLAR FAMELS 13 5 3 0 5 2504. 399242. 430. .. FRAME 5 5 3 0 5 .. 71757. AAL ABLY & 0/0 0 5 0 0 287. 39508. 43. P. CLECTRICAL SYSTEM 1) FORER CONDITIONING 1 S 2 0 S0 . .84. 153. ***** AC AAST & 0.0 0 5 0 0 11. *** FOR MODEL REVISION NINE 22 FEB 1983 *** *** EDEING*LOEING ** FOM HOURS SUMMER! HOURS FOR A FORTHLEICHEOFF OF ****

*** FCM MODEL REVISION NINE 20 FEB 1983 ***

TOTAL (SM) (NOMINAL SCHEDULE)

0.39:

0.743

0

PAYLOAD ELEIERT HATE CODE STEGLE CRYSTAL EHODIUM VAFERS BACK2027	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Hame JAG. J. SING Address MASA-LANGLEY RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 2
Desired First Flight, Year: 1996 Number of Flights 1 Dur	ation of Flight, Days 90
OBJECTIVE DEVELOP TECHNOLOGY FOR THE GROWTH OF THIN (500-1000 A) PERFECT SINGLE CRYSTAL UAFERS. ONE SPECIFIC APPLICATION OF INTEREST IS TO DEVELOP RH103 UMFERS FOR USE IN PD 103 HOSSBAUER GRAVITOHETRY.	
DESCRIPTION OUR EFFORTS TO DATE LAVE HOT SUCCEEDED IN DEVELOPING SINGLE CRYSTAL RH 103 WAFERS	OF SUFFICIENT PERFECTION
	S EXPECTED THAT AN MBE GROWTH.
OUR EFFORTS TO DATE LAVE NOT SUCCEEDED IN DEVELOPING SINGLE CRYSTAL RH 103 WAFERS TO PERIOT SUCCESSFUL MOSSBAUER SPECTROMETRY BASED ON PD103-RH103 TRANSITION, IT I	S EXPECTED THAT AN MBE GROWTH.
OUR EFFORTS TO DATE LAVE HOT SUCCEEDED IN DEVELOPING SINGLE CRYSTAL RH 103 WAFERS TO PERMIT SUCCESSFUL MOSSBAUER SPECTROMETRY BASED ON PD103-RH103 TRANSITION, IT I	S EXPECTED THAT AN NBE GROWTH.
OUR EFFORTS TO DATE L'AVE NOT SUCCEEDED IN DEVELOPING SINGLE CRYSTAL EN 103 WAFERS TO PERMIT SUCCESSFUL HOSSBAUER SPECTRONETRY BASED ON PD103-RH103 TRANSITION. IT I GROUTH EXPERIMENT IN MEAR-ZERO G ENVIRONMENT WILL PERMIT STRAIN-FREE CRYSTALLINE ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perimee, km 500 Tolerance +	S EXPECTED THAT AN MBE GROWTH. OF ROW PROPERTY OF PAGE THE PAGE Any
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Hodal Angle, deg Escape dy Required, m/s POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec ORBIT CHARACTERISTICS () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Tolerance + Ephemeris Accuracy () Inertial () Solar () Earth (X) Field of View (dec.	S EXPECTED THAT AN MBE GROWTH. OF ROW PRODUCT PAGE TO SEE THAT AN MBE OF ROW PAGE Any

equired	Frequency (Mz):	
	Nours/Day Voice (Hours/Day): Other: Downlink command rate: Downlink Frequency (MIz):	
	DOWNTINK Frequency (MIZ).	
n-operational Minimum erational Minimum	Haximum Haximum Maximum Haximura	
(X) Pressurized () 00 U, m: 1.00 H, 1 00 U, m: 1.00 H, 1 kg: 200 Reti	a: 1.00 Stowed a: 1.00 Deployed arn mass, kg:	ORIGINAL POP POOR Q
Task Assignments		PAGE IS
Skill 3	1 1 1 1 1 1	マローマー マー・マー・マー・マー・マー・マー・マー・マー・マー・マー・マー・マー・マー・マ
Level 3	1 1 1 1	
Reason	Hours/EVA	
Interval days	Consumables to	
Returnables, kg	lian hours	
Doliverables kg	Patumahlas ke	
Popo	Required and Rate (KBS): Ing Required (Composed Composed	and Rate (RBS): Ing Required Og () Digital Og () Digital Other: Other: Occupational Hinimum On-operational Hinimum Ilaximum Ilaximu

SPECIAL COMSIDERATIONS/See Instructions

```
Boeing-Specific Input Data
Free Flyer
                                                           OPS CODE
    | | Hot Serviced | Remote THS | Remote Harmed
                                                               FI
         Serviced at Station (THS Retrieved)
                                                               FST
    ( ) Serviced at Station (Self-propelled)
                                                               FS
    Platform Based
                                                               P
       ) Hot Serviced
                                                               PT
         Remote TilS
        Remote Manned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                               PH
                                                               PS
      her
Space Station Based
Sortie
                                                               SS
                                                                                                                                                        OF POOR QUALITY
CONSTRUCTION/SERVICING COMPLEXITY
      Lou
        liedium
      ) High
Operations Times
    OTV Up/Down
                                             0 days
    OTV or TIS on Orbit
                                             0 days
                                           45 days/year
2 man-days/year
0 man-days/year
    Hission Use
    TVA Service
EVA Service
                                          45 man-days/year
1 times/year
    Experiment Ops
    Service Frequency
Delta Velocities
    Up
    Down
Aero Return
Support Equipment
                                                                                                                                      (Stowed)
(Deployed)
                                                                              meters
                 Length:
Length:
                                        meters
                                                         Width:
                                                                                                                       meters
                                        meters
                                                                                                                       meters
                                        kg
                 Hass:
Manifest Restrictions
    (X) No Restrictions
         Only with compatible payloads
Fly-Alone
Hust have Docking Hodule
Length of Beam Fab
Humber of Appendages
Humber of Fodules Required to Assemble the Payload 1
```

Cost Data

Hame and Phone Humber: G. REID 3-2020

DESCRIPTION OUR EFFORTS TO DATE HAVE NOT SUCCEEDED IN DEVELOPING SINGLE CRYSTAL RH 103 WAFERS OF SUFFICIENT PERFECTION TO PERHIT SUCCESSFUL MOSSBAUER SPECTROMETRY BASED ON PD103-RH103 TRANSITION. IT IS EXPECTED THAT AN IBE GROUTH EXPERIMENT IN NEAR-ZERO G ENVIRONMENT WILL PERHIT STRAIN-FREE CRYSTALLINE GROUTH.

Item Dry Weight: 440 pounds

Volume: 4.

4.40 cubic feet

Structural Veight (includes typical "mechanical" items listed below): 400.00 pounds

Design Complexity: 3

Hanufacturing Complexity for Structural/Mechanical Items: 3
Typical "mechanical" items include enclosures, optics, motors, blowers, gyros, batteries, cables, connectors, switches, indicators, cathode ray tubes, antennas without electronics, mechanisms, waveguides, etc.

Electronic Equipment Description:

Apalog 10 Digital Power Supplies 90

ipplies 9

Hanufacturing Complexity for Electronic Items:

Weight of the Circuit Board and Electronics Mounted on it: 2.00 pounds

Other

Material Used for the Enclosure:

Hachine Casting?

Of the electronics weight, what % is off-the-shelf?

Of the sturctural weight, what % is off-the-shelf?

Hanufacturing Degree of Automation

Electronics { } Low lechanical

(x) Hedium

{ } High

Is the item Hardened? No

--- PRICE 84 ---

DATE 4-MAR-83

(283010)

FILENAME: REID. DAT

FURNACE---SINGLE CRYSTAL RHODIUM WAFERS

1		UNIT	WEIGHT	202.00	MODE	
PROTOTYPE QUANTITY	3.000	TINU	VOLUME	4.40	QUANTITY/NHA	
PROGRAM COST(* 1000)	DEVELO	EMENT	PRO	DUCTION	TOTAL COST	
ENGINEERING	PLVLLO		1 10	DOCT TON	TOTAL COOT	
DRAFTING	1	56.		_	154.	
DESIGN	4	91.			491.	
SYSTEMS		74.			74.	
PROJECT MGMT	2	70.			270.	
) DATA		33.			33.	
SUBTOTAL (ENG)	10	25.		-	1025.	
MANUFACTURING						
! PRODUCTION		-			-	
, PROTOTYPE	2	96.		-	296.	
TOOL-TEST EQ	1	98.		-	198.	ì
SUBTOTAL (MFG)	. 4	94.		-	494.	
TOTAL COST	15	19.		_	1519.	

OF POOR QUALITY

SINGLE CRYSTAL RHODIUM WAFERS 2027

IVA Prepare work area Checkout oven Obtain sample from storage Mount sample in oven Set oven controls Close & secure oven door Turn on oven Activate timer Monitor sample progress Turn off oven Open oven door Remove rhodium crystal Analyze crystal Package crystal for return to earth Clean up lab area

PAYLOAD LLELENT HAME CODE HABITABILITY CRITERIA VALIDATION BACK2029	TYPE	and Applications (Non-comm.)
COUTACT Hgue B.G. STEPHENS Address LANGLEY RESEARCH CENTER	() Operati	ogy Development
Telephone	1 = Lov Va	of the Space Station to it lue, But Could Use
STATUS () Operational () Approved () Planned () Ca	andidate (X) Opportunity Scale = 10)
Desired First Flight, Year: 1995 Humber of F		Days 365
OBJECTIVE VALIDATE HOISE AND VIBRATION ENVIRONMENT CRITERIA FOR	LONG DURATION	
TAINED SPACE MISSIONS.	Long Bottation	2.6
		ORIGINAL OF POOR
		NIE OO
DESCRIPTION		-
OBJECTIVE AND SUBJECTIVE TESTS WILL BE CONDUCTED TO VA AND VIBRATION ENVIRONMENT OF THE SPACE STATION. TESTS VIBRATION ENVIRONMENT ON HEARING, SPEECH, TASK PERFORM OTHER TESTS WILL MEASURE AND MONITOR THE NOISE AND VIE COMPARISON WITH PREDICTED ENVIRONMENTS.	WILL ASSESS THE EFFECTS OF THE SPACE STATION	NOISE AND BO
OREIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) Ho Apogee, km 500 Perigee, km I clination, deg 28.5 Lal Angle, deg Cape dv Required, m/s	500 Tolerance + - Tolerance + - Ephemeris Accuracy, m	
POINTING/ORIENTATION View birection () Inertial () So Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	olar () Earth (X) Any Field of View (deg)	
POWER () AC () DC Power, W Duration, Urs/Da	ıy ·	
Gperating 200 Standby Peak Voltage, V Frequency, Hz	() Continuous	

DATA/ColdWHICATIONS Souttoring Requirements: (X) Hone () Realtime (X) Encription/Decription Realtime (X) Uplink Required: Command (X) On-Board Data Processin (X) Description: (X) Data Types: () Analo (X) Film (Amount): Live TV (Hours/Day): (X) On-Board Storage (Hibit) (X) Data Dumap Frequency (Per Recording Rate (KBPS)	required ad Rate (KBS): Required Hours/Day Voice (Hours/Day): Other:		
THERIAL () Active () Passive Temperature, deg C Op No Neat Rejection, w Op	erational Minimum Maximum n-operational Minimum Maximum n-operational Minimum Maximum n-operational Minimum Maximum	•	
EQUIPMENT PHYSICAL CHARACTERIS Location (X) Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration	(X) Pressurized () Unpressurized 50 V, m: 0.50 H, m: 0.50 Stowed 50 V. m: 0.50 H. m: 0.50 Deployed	OF OR	
CREA REQUIREMENTS Crew Size 1	Task Assignments	FOOR	
Skills (See Table E)	Skill	R QUALITY	
EVA (X) Yes () No	Hours/Day	! ₹ a	
SERVICING/MAINTENANCE Service: Configuration Changes:	Interval, days Consumable Returnables, kg Man hours Interval, day Man/Hours Deliverables, kg Returnable	Required	

SPECIAL CONSIDERATIONS/See Instructions

		Eoe	ing-Specific 1	Input Data			
HISSIGH TYPE Free Flyer () Hot Serviced () Educate THS () Remote Hanned () Serviced at Station () Serviced at Station	(TIIS Retrieved) (Self-propelled	OPS CCDE F FT FH FST					
Platform Based () Not Serviced () Remote ThS () Remote Nammed () Serviced at Station () Serviced at Station	(TNS Retrieved) (Self-propelled	P PT PM PST PS					
Other (X) Space Station Based (X) Sortie		SS SOR					of on
CONSTRUCTION/SERVICING COMP	LEXITY						POOR C
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use 1VA Service EVA Service Experiment Ops Service Frequency	0 days 0 days 365 days/y 4 man-da 2 man-da 15 man-da 2 times/	ys/year vs/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return							
Support Equipment Length: Length:	meters meters	Vidth:	meters meters	Height: Height:	meters meters	(Stowed) (Deployed)	
Mass:	kg						
Manifest Restrictions (%) No Restrictions () Only with compatible () Fly-Alone () Hust have Docking Mod	payloads dule						
Leugth of Lem. Fab Number of Abbendages Number of Hodules Required		Payload 1					

--- PRICE 84 --- ELECTRONIC ITEM

DATE 4-MAR-83

TIME 10:48

FILENAME: REID.DAT

(283010)

HABITIBILITY CRITERIA VALIDATION (NOISE LEVEL METER)

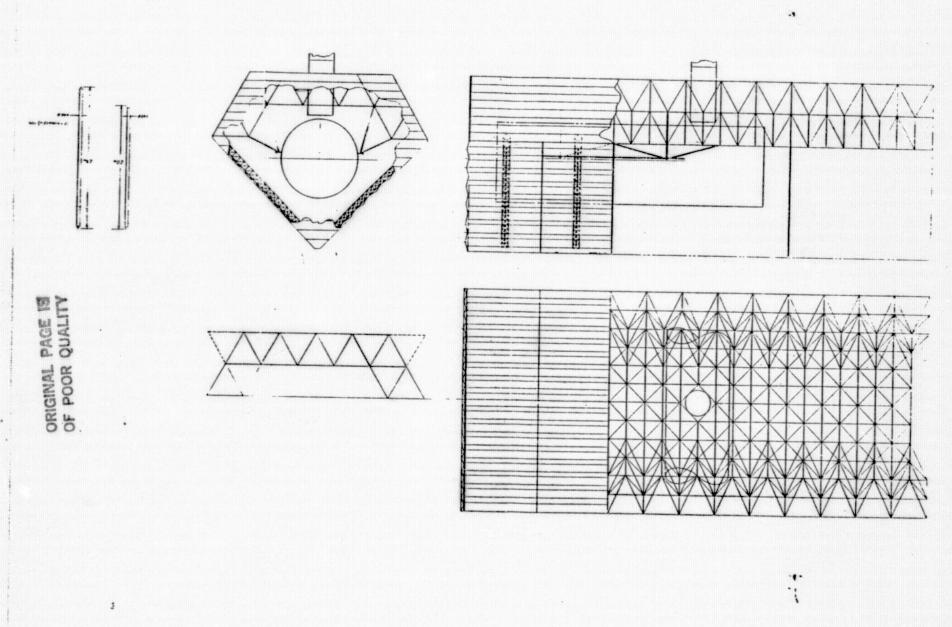
l.		TINU	WEIGHT	10.00	MODE	1
PROTOTYPE QUANTITY	3.000	TINU	VOLUME	1.00	AHM\YT1TMAUD	1
PROGRAM COST(\$ 1000)	DEVELOP	MENT	PROI	DUCTION	TOTAL COST	
ENGINEERING						
DRAFTING	10	9.		-	109.	
DESIGN	34	2.		-	342.	
SYSTEMS	5	2.		-	52.	
PROJECT HGHT	19	ó.		-	196.	
DATA	2	4.		-	24.	
SUBTOTAL (ENG)	72	1.		-	721.	
MANUFACTURING						
PRODUCTION		-		-		
PROTOTYPE	26	3.		-	263.	1
TOOL-TEST EQ	15	1.		-	151.	
SUBTOTAL (MFG)	41	4.		-	414.	
TOTAL COST	113	5.		-	1135.	

OF POOR QUALITY

PAYLOAD ELEHENT MANE CODE SPACECRAFT HANGAR (LSS-2) BACX2034	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Name RICHARD GATES Address BOEING AEROSPACE CO PO BOX 3999 SEATTLE, UA 98124	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone (206) 773-2020	Importance of the Space Station to
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 8
Desired First Flight, Year: 1990 Number of Flights 1 Duration	of Flight, Days 365
LARGE SPACE STRUCTURES TECHNOLOGY DEMONSTRATIONS (DEPLOYMENT AND ASSEMBLY, SUBSYSTEM INSTALLATION AND CHECKOUT, DEMONSTRATION OF MAN'S ROLE AND CAPABILITIES IN SPACE). FOLLOWING THE TDM, THIS STRUCTURE WILL SERVE AS A PERMANENT SPACE STATION FACILITY.	
DESCRIPTION THE SPACECRAFT HANGAR FACILITY IS A DEPLOYABLE OR ASSEMBLABLE STRUCTURE TO PROVIDE SOLAR RADIATION AND MICBOMETERIORITE PROTECTION FOR PERSONNEL, SPACECRAFT AND OTV'S WHILE SERVICING IS BEING PERFORMED. ELECTRICAL POWER AND LIGHTING WILL BE PRO- VIDED AS WELL AS CONTAINMENT FOR TOOLS, PARTS & PERSONNEL.	ORIGINAL POOR Q
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, deg 28.5 Nodal Angle, deg Any Escape dV Required, m/s	PAGE IS
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	
POUER (X) DC Power, U Duration, Hrs/Day	
Operating 500 Standby Peak (X) Continuous	

Voltage, V	Frequency, Hz			
DATA/COMMUTCATIONS Honitoring Requirements: () Hone (X) Realtime () Encription/Decription Re () Uplink Required: Comman () On-Board Data Processing	() Offline () Other: equired nd Rate (KBS): g Required	Frequency (MHz):		
Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Eoard Storage (Mbit) Data Dump Frequency (Per Recording Rate (KBPS)	g () Digital	Hours/Day Voice (Hours/Day): Other: Downlink command rate: Downlink Frequency (MHz):		
THERMAL				
() Active (X) Passive Temperature, deg C Open Normalis (Normalis	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Maximum Maximum Maximum Maximum		
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	(X) External (X) Pressurized (eturn mass, kg:	5.23 meters 9.00 meters	(Stowed) (Deployed)
CREW REQUIREMENTS Crew Size	Task Assignments		\ \	ORIGINAL OF POOR
Skills (See Table B)	Skill 11 12	13	ī	POC
	Level 3 3	1 3 1 1 1	ī	RAL
	Hours/Day	1 1 1 1	1	PAC
EVA (X) Yes () No	Reason CONSTRUCTION	Hours/EVA 120		PAGE 8
SERVICING/MAINTENANCE Service:	Returnables	lays Consumables	kg	≺ 26
Configuration Changes:		lays Man/Hours Required kg Returnables	kg	

SPECIAL CONSIDERATIONS/See instructions AS A TECHNOLOGY DEHONSTRATION MISSON (TDM), REALTIME MONITORING (TV) AND DATA MEASUREMENT EQUIPMENT (STRUCTURAL DYNAMICS, THERMAL DEFLECTIONS) WILL BE REQUIRED. FOLLOWING THE TDM, SYSTEM STATUS (RETRACTED/DEPLOYED/LATCHED) INSTRUMENTATION WILL BE REQUIRED.



REVISION NINE (15 FEBRUARY 1982)

LASE SPACE STATION HARDWARE (DEV) DURAP 60 95 130 50 120 60 30 15 REMOTE 0 0 ASUFFORT 1 .3 1 .5 BSUPPORT .5 .2 1 1 1 WEIGHT 0 0 5 600 SCHEDULE 0 0 FINAL 1 0 FLIGHT 0 0 TOOLING 1 SPARES 10 EETS 1 CLASS O DEV

*** PCM HODEL REVISION NINE 18 FEB 1733 ***

ENGINEERING ***** ENGINEERING ****** ENGINEERING ***** ENGINEERING

	SASSESSES MILLIONS	********	*****	**** BOEIN	3 ********	SUB. OFE
					DES 3 SHOP DOLLARS	TOTAL DOLLARS

32	STRUCTURE HANGAR				,	
47	HANGARSTRUCTURE 150	4 1.2.00				
			19497.	5849	. 1.725	
14.2	HANGAR SUPPORT 450	4 1.2 0 0				
			12603.	3781	. 1.115	

HF G

*** PCM-HODEL REVISION NINE

18 FEB 1983 ***

HARDWARE ASSEMBLY 1 C/C 1365

10 . 10 . 10 1 2 1 TO F . TO S . TO S .

	******** HILLIUMS			u.C. HOURS	MANUFACTUR DOLLARS	TOTAL DOLLARS
82	STRUCTURE HANGAR HANGAR-STRUCTURE 150	4 2 0 0				
n2	HANGAR-SUFFORT 450 4	100	4943.	742.	0.660	
END			2965.	442.	0.408	
	*** PCH MODE	L REVISION N	INE	18 FEB 1	753 AAA	

TITLE: SPACE STATION HARDWARE (DEV)

	BDEING HARDWARE				
		DESIGN	LEV .HOF	1.1.4.	3.0.
à.	STRUCTUREHANGAR	32100	7630	1913	1137
	BOEING SUBTOTAL	32100	7610	7913	1187

BOEING SUPPORT HOURS	
SYSTEM ENGINEERING & INTEGRATION	7029
SOFTWARE ENGINEERING	1759
SYSTEMS GROUND TEST CONDUCT	4083
SYSTEMS FLIGHT TEST CONDUCT	
SUPPORT EQUIPMENT DESIGN	891
SUPPORT EQUIPMENT MFG	973
TOOLING & SPECIAL TEST EQUIPMENT	2871
SPARES	910
LIAISON ENGINEERING	834
DATA	250.
- ROGRAM MANAGEMENT (ENG)	7288
FROGRAM MANAGEMENT (MFG)	2496

DOING HOUSE SAMMER WITH A STREET WAS A STREE * BOEING DESIGN & DEV SHOP HOURS * PREING MARDWARE SHU & GC HOURS

SULLAND EMPACHENT S. ST.		and the same of th	
TOOLING & SPECIAL TEST EQUIPMENT : . 2891			
SPARES 910		ORIGINAL PAGE	· 17559
TATOR CHECKERS OF A			
DATA 2504		OF POOR QUAL	ITY
PROGRAM MANAGEMENT (ENG)		or, room gone	
PROGRAM MANAGEMENT (MF6) 2698			
BOEING HOURS SU	MMARY RECAP		

# BOEING DESIGN & DEV SHOP HO		41700 4	
BOEING HARDWARE BEL & GC HO	URS	105G0 ¥	
* BOEING SUPPORT HOURS		33800 *	
* BOEING PROGRAM HOURS . NOMIN	AL SCHEDULE	86000 *	
i section processing means means		*********	

*** PCM MODEL REVISION NINE 1	8 FEB 1983 *	***	

**************************************		************	
***************************************	************	***************************************	
TITLE: SPACE STATION HARDWARE (DEV)			
		SPHENTAL	
	ENGR.	HARDWARE	
MARDWARE SUBSYSTEM COST (\$M)			
B2 STRUCTUREHANGAR	2.641	1.068	
DE STRUCTURE TRANSPIR	2,641		
SUBSYSTEM HARDWARE SUBTOTAL (\$6)	2.841		
CONTRACTOR CONTRACTOR CANAL			
GFE/SUBCON/GIVEN COST (\$H)			
GFE/SUBCON/GIVEN COST (\$H)	0.0	0.0	

GFE/SUBCON/GIVEN COST (\$H) SUBCON/GIVEN (\$1-S50) SUBTOTAL (\$H)			

SUBCON/GIVEN (S1-S50) SUBTOTAL (\$M) HARDWARE ASSEMBLY & C/O		0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (*H)		0.0	
SUBCON/GIVEN (S1-S50) SUBTOTAL (*H) HARDWARE ASSEMBLY % C/O HARDWARE SUBTOTAL (*H)		0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$M) SUFFORT COST (\$M)	0.0	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING & INTEGRATION	0.422	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (SH) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (SH) SUFFORT COST (SH) SYSTEM ENGINEERING & INTEGRATION SOFTWARE ENGINEERING	0.5 0.422 0.143	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING & INTEGRATION	0.422	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING & INTEGRATION SOFTWARE ENGINEERING SYSTEMS SROWND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FECULIAR SUFFORT EQUIPMENT	0.5 0.422 0.143 0.312	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$M) HARDWARE ASSEMBLY % C/O HARDWARE SUBTOTAL (\$M) SUFFORT COST (\$M) SYSTEM ENGINEERING % INTEGRATION SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT	0.422 9.143 0.312	0.043 1.251 0.092 0.347	
SUBCON/GIVEN (S1-S50) SUBTOTAL (**H) HARDWARE SUBTOTAL (**H) SUPPORT COST (**H) SYSTEM ENGINEERING 1 INTEGRATION SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FECULIAR SUPPORT EQUIPMENT TOOLING 1 SPECIAL TEST EQUIPMENT SPARES	0.422 0.143 0.1312 0.0 0.063	0.163	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING SYSTEMS GROUND FEST CONDUCT SYSTEMS GROUND FEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FEGULIAR SUFFORF EQUIPMENT TOOLING & SPECIAL TEST EQUIPMENT SPARES LIAISON ENGINEERING	0.422 0.143 0.312 0.0 0.063	0.043 1.251 0.092 0.347	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$M) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$M) SUFFORT COST (\$M) SYSTEM SEGINEERING & INTEGRATION SOFTWARE ENGINEERING SYSTEMS AROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPMENT SPARES LIAISON ENGINEERING DATA	0.5 0.422 0.143 0.312 0.0 0.063	0.0 0.163 1.251 0.092 0.347 0.109	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING SYSTEMS GROUND FEST CONDUCT SYSTEMS GROUND FEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FEGULIAR SUFFORF EQUIPMENT TOOLING & SPECIAL TEST EQUIPMENT SPARES LIAISON ENGINEERING	0.5 0.422 0.143 0.312 0.0 0.063	0.0 0.163 1.251 0.092 0.347 0.109	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE SUBTOTAL (\$M) SUFFORT COST (\$M) SYSTEM ENGINEERING SYSTEMS SADUND FEST CONDUCT SYSTEMS SADUND FEST CONDUCT SYSTEMS SELIGHT TEST CONDUCT FEGULIAR SUFFORF EQUIPMENT TOGLING & SPECIAL TEST EQUIPMENT SPARES LIAISON ENGINEERING DATA FROGRAM MANAGEMENT	0.422 0.143 0.312 0.0 0.063	0.0 0.163 1.251 0.092 0.347 0.109	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$H) HARDWARE ASSEMBLY & C/O MARDWARE SUBTOTAL (\$H) SUFFORT COST (\$H) SYSTEM ENGINEERING & INTEGRATION SOFTWARE ENGINEERING SYSTEMS SROWND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPMENT SPARES LIAISON ENGINEERING DATA	0.5 0.422 0.143 0.312 0.0 0.063	0.0 0.163 1.251 0.092 0.347 0.162	
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$M) HARDWARE SUBTOTAL (\$M) SUFFORT COST (\$M) SYSTEM ENGINEERING 1 INTEGRATION SOFTWARE ENGINEERING SYSTEMS SHOUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT FEGULIAR SUFFORT EQUIPMENT TOOLING 1 SPECIAL TEST EQUIFMENT SPARES LIAISON ENGINEERING DATA FROGRAM MANAGEMENT	0.422 0.143 0.312 0.0 0.063	0.0 0.163 1.251 0.092 0.347 0.162	

7.1

PAYLOAD ELEMENT HAVE LATERIALS EXPOSURE LAB CODE LACKZ035	(Science and Applications (Non-comm.) (Commercial (Y Technology Development
CONTACT Hame Address	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
TElephone STATUS (A) Assessed (A) Planned (Y) Candidate (A) Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
() Operational () Approved () Planned (X) Candidate () Opportunity Desired First Flight, Year: 1998 Number of Flights 2	Ouration of Flight, Days 365
OBJECTIVE DEVELOPMENT, MATERIALS TESTING TECHNIQUES.	
DESCRIPTION PROVISIONS WOULD BE PROVIDED TO ATTACH MATERIAL SPECIMENS TO THE SPACE STATION CANISTERS TO PROVIDE LONG TERM EXPOSURE TO SOLAR RADIATION. THE SPECIMENS WOULD PERIODICALLY VIA EVA FOR TESTING.	SOLAR ARRAY D BE RETRIEVED
	ORIGINAL:
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Hodal Angle, deg Any Escape dV Required, m/s	QUA
POTUTTIC/OPTERTATION	(deg)
POWER () DC () DC Power, U Duration, Hrs/Day	
Cperating Standby Peak Voltage, V Frequency, Hz	
DATA/COLLIUUTCATIONS Houitoring Requirements:	

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99
OF POOR
200
PAGE

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OPS CODE
HISSION TYPE
   Free Flyer
(X) Renote THS
                                                           FT
                                                           FI
        Remote Hanned
                                                           FST
        Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                           FS
   Platform Based
        Hot Serviced
                                                           PT
PH
        Remote This
Remote Hanned
                                                           PST
        Serviced at Station (THS Retrieved)
    ( ) Serviced at Station (Self-propelled)
                                                           PS
   Other (X) Space Station Based
    ( ) Sortie
                                                           SOR
CONSTRUCTION/SERVICING COMPLEXITY
    ( ) Low
    (X) Hedium
Operations Times
   OTV Up/Down
                                          0 days
   OTV or This on Orbit
                                       0 days
365 days/year
5 man-days/year
    IVA Service
                                         8 man-days/year
12 man-days/year
4 times/year
    EVA Service
    Experiment Ops
Service Frequency
Delta Velocities
   Down
   Aero Return
Support Equipment Length:
                                                                                                                              (Stoved)
                                                     Width:
                                                                                           lleight:
                                                                                                                meters
                                                                         meters
                                     meters
                                                                                                                              (Deployed)
                                                     Width:
                                                                                          Height:
                                                                                                                meters
                                                                         meters
                Length:
                                     meters
                                     kg
                Mass:
Manifest Restrictions
    (X) No Pestrictions
    Only with compatible payloads
Fly-Alone
Must have Docking Module
Length of Beam Fab
Humber of Modules Required to Assemble the Payload
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ORIGINAL PAGE 18 OF POOR QUALITY

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TY SPACES PCHOUT
  START S
         REVISION NINE (15 FEBRUARY 1782)
  CASE MATERIALS EXPOSURE LAB (SS TEST HARDWARE)
  DWRAP 60 95 130 50 120 60 30 15
   ABUPPORT 1.0 .3 1 1
BSUPPORT 1 .2 1 1 1
WEIGHT 0 0 20 150
   SCHEDULE 0 0
  FINAL 1 0
FLIGHT 0 0
   TOOLING
   SPARES 10
  SETS 1
  CLASS 0
  DEV
                           *** FCM MODEL REVISION NINE
                                                                                                           22 FEB 1783 ***
  SUB/OFE
                                                                                         ******** BOEING ********
                                                                                        DESIGN DEV SHOP DES & SHOP
                                                                                                                                                                  TOTAL
                                                                                                          HOURS
                                                                                                                                  DOLLARS
                                                                                                                                                               DOLLARS
                                                                                          HOURS
 81 STRUCTURE
M7 FRAME 130 2 1.2 1 0 20
                                                                                               7457.
                                                                                                                 2837. 836969.
  MIT INTEG & TEST 0 3.0 0
                                                                                               1038.
                                                                                                                    311.
                                                                                                                                             91845.
  LHD
  HFO
                           *** FCH MODEL REVISION NINE 22 FEB 1983 ***
   HANUFACTURING *** MANUFACTURING *** MANUFACTURING *** MANUFACTURING **** MANUFACTURING
                                                                                        ******** BOEING ********
                                                                                                                                                            SUB/GFE
                                                                                        B.F.L. G.C. MANUFACTUR
HOURS HOURS DOLLARS
                                                                                                                                                               TOTAL
  31 3TRUCTURE
47 FRAME 150 2 1 3 0 20
                                                                                               4729.
                                                                                                                    709.
                                                                                                                                          650252.
   MAC ASSY & C/G 0 3 0 0
                                                                                                 245.
                                                                                                                       37.
                                                                                                                                              33707.
   END
                                                                                                    22 FEB 1983 ***
                            *** PCM MODEL REVISION NINE
   ALTAKAKAN TETAKAN TETAKAT TETAKAT TANDAN TETAKAN TANDAN TETAKAN TANDAN TETAKAN TANDAN TETAKAN 
   TITLE: MATERIALS EXPOSURE LAB (83 TEST MARDWARE)
                         BOEING HARDWARE SUBSYSTEM HOURS
                                                                                   LESION
                                                                                                          DEV SHOP
                                                                                                                                         3. F. L.
                                                                                                                              4574
                                                                                                                                                                           746
                                                                                                          2147
     11 STRUCTURE
                                                                                     10495
                          SOE .NO SUBTOTAL
                                                                                    10495
                                                                                                                 3149
                                                                                                                                             4974
                                                                                                                                                                              740
                                                                                     HARDWARE ISJEMBL 1 0. 9
                                                                                                                                                               35:
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SAUCH TROYAUS CATTOL A STAR CACTURERING & INTERCATION

		LETIE.	4.8		.F	

	BI STRUCTURE	10495	31	49		740
	BUEING SUBTOTAL	10495	31	49	4974	746
		HARDWAR	E ASSEMB	LY & C/G		858
	DOEING SUFFORT HOURS					
	SYSTEM ENGINEERING & INTEGRATION		2898 721			
	SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT		1151			
			0			
	SUPPORT EQUIPMENT DESIGN		514 583			
	SUFFORT EQUIPMENT HFG TOOLING & SPECIAL TEST EQUIPMENT		998			
	SPARES		572			
	LIAISON ENGINEERING		524			
	uATA		846			
	PROGRAM MANAGEMENT (ENG)		3192 1554			
	PROGRAM MANAGEMENT (MFG)		1334			
		GEING HOU	RS SUMMA	RY RECAP		
	***********	*******	******	*******	*******	
	* BOEING DESIGN					13600 +
	* BOEING HARDWA					13600 *
	* BUEING SUFFUR	1 HUUKS				
	* BOEING PROGRA	H HOURS (NOMINAL	SCHEDULE)		33800 #
	•					*
	************					*******
	*** PCM MODEL REVISION	NINE	22 F	EB 1933	***	
,	***************************	*******	******	:::	*******	*******
	TITLE: MATERIALS EXFOSURE LAB (8	8 FEST HA	ALTHARE:	******** 	*******	*******
	TITLE: HATERIALS EXFOSURE LAB (8	8 FEST HA	ALTHARE:		OFMENTAL	
•	TITLE: HATERIALS EXFOSURE LAB (8	8 FEST HA	ALTHARE:		*******	
	TITLE: MATERIALS EXFOSURE LAB (S	8 FEST HA	A A.D.WAKE:	DEVEL	OFMENTAL HARDU	
	TITLE: MATERIALS EXFOSURE LAB (S	8 FEST HA	A A.D.WAKE:	DEVEL	OFMENTAL HARDU	
	TITLE: MATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (PM) SI STRUCTURE	8 (EST HA	ADWARE,	DEVEL ENGK.	OFMENTAL HARDW	14.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSTITUTE COST (PM) ST STRUCTURE FURSYSTEM HARDWARE SUBTOT	8 (EST HA	ADWARE,	DEVEL	OFMENTAL HARDW	
	TITLE: MATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (PM) SI STRUCTURE	8 (EST HA	ADWARE,	DEVEL ENGA. 3.929	OFMENTAL HARDW	
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSTITUTE COST (PM) ST STRUCTURE FURSYSTEM HARDWARE SUBTOT	8 (EST HA	******* *DWAKE)	DEVEL ENGA. 3.929 0.729	OF MENTAL HARDIN	484 484
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (PM) ST STRUCTURE SUSSYSTEM HARDWARE SUBTOT GREYSUSCHIVELVEN COST (FM)	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	OF MENTAL HARDIN	ARE
•	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSTITUTE COST (PM) ST STRUCTURE FURSYSTEM HARDWARE SUBTOT	S (EST HA	******** *****************************	DEVEL ENGA. 3.929 0.729	OF MENTAL HARDI	ARE
•	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (PM) ST STRUCTURE SUSSYSTEM HARDWARE SUBTOT GREYSUSCHIVELVEN COST (FM)	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	DEMENTAL HARDW	ARE
,	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (PM) SUBSYSTEM HARDWARE SUBTOT GREZOUSCONZOLVEN COST (PM) SUBCONZOLVEN (S1-850) SUS HARDWARE ASSEMBLY & CZO	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	OF MENTAL HARDI	664 684 0
,	TITLE: MATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (PM) STRUCTURE SUBSYSTEM HARDWARE SUBTOT SPENSOR CONTROL (PM) SUBCON/GIVEN (S1-850) SUB	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	OF MENTAL HARDI	ARE
,	TITLE: MATERIALS EXFOSURE LAB (S MARDMARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDMARE SUBTOT GFE/SUSCOM/GIVEN COST (\$M) SUBCON/GIVEN (\$1-850) SUB HARDMARE ASSEMBLY 3 C/O HARDMARE SUBTOTAL (\$M)	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	OF MENTAL HARDI	664 684 0
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (PM) SUBSYSTEM HARDWARE SUBTOT GREZOUSCONZOLVEN COST (PM) SUBCONZOLVEN (S1-850) SUS HARDWARE ASSEMBLY & CZO	S (EST HA	******** *****************************	DEVEL ENGK. 3.929 0.929	OF MENTAL HARDI	664 684 0
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT JECOMOGIVEN (S1-850) SUS HARDWARE ASSEMBLY 3 C/O HARDWARE ASSEMBLY 3 C/O HARDWARE SUBTOTAL (\$M) SUPPORT COST (\$M) SYSTEM ENGINEERING 3 INTEGRAT SOFTWARE ENGINEERING	S (EST HA	******** *****************************	DEVEL ENGA. 3.929 0.929	OF MENTAL HARDI	664 684 0
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (PM) SUSSYSTEM HARDWARE SUBTOT GREYOUSCONVOIVEN COST (FM) SUBCONVOIVEN (S1-850) SUB HARDWARE ASSEMBLY 3 C/O MARDWARE SUBTOTAL (FM) SUPPORT COST (FM) SYSTEM ENGINEERING 3 INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT	S (EST HA	******** *****************************	DEVEL ENGR. 3.727 0.727 0.00	OF MENTAL HARDI	664 684 0
,	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT GREZOUSCONZOLVEN COST (\$M) SUBCONZOLVEN COST (\$M) SUBCONZOLVEN COST (\$M) SUBCONZOLVEN COST (\$M) SUPPORT COST (\$M) SYSTEM ENGINEERING 3 INTEGRAT SUFTWARE SUBIORERING SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT	S (EST HA	******** *****************************	DEVEL ENGR. 3.929 0.729 0.000		664 684 0 103 787
,	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (PM) SUSSYSTEM HARDWARE SUBTOT GREYOUSCONVOIVEN COST (FM) SUBCONVOIVEN (S1-850) SUB HARDWARE ASSEMBLY 3 C/O MARDWARE SUBTOTAL (FM) SUPPORT COST (FM) SYSTEM ENGINEERING 3 INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT	S (EST HA	******** *****************************	DEVEL ENGR. 3.727 0.727 0.00	0. 0.	ARE
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (PM) SUBSYSTEM HARDWARE SUBTOT GREYOUSCONGIVEN COST (FM) SUBCONGIVEN (S1-850) SUS HARDWARE ASSEMBLY & C/O MARDWARE SUBTOTAL (FM) SYSTEM ENGINEERING & INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES	S (EST HA	******** *****************************	DEVEL ENGK. 3.727 0.727 0.00	0. 0.	684 484 0 0 103 787
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT GENOLOGYMOIVEN COST (\$M) SUBCONVOIVEN (\$1-850) SUS HARDWARE ASSEMBLY & C/O HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING	S (EST HA	******** *****************************	DEVEL ENGR. 3.727 0.729 0.00 0.174 0.059 0.00 0.036	0. 0.	ARE
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT GREZOUSCONZOIVEN COST (\$M) SUBCONZGIVEN (\$1-850) SUS HARDWARE ASSEMBLY & CZO MARDWARE ASSEMBLY & CZO MARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING DATA	S (EST HA	******** *****************************	DEVEL ENGA. DEVEL ENGA. 	0. 0. 0.	684 684 0 0 103 787
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT GENOLOGYMOIVEN COST (\$M) SUBCONVOIVEN (\$1-850) SUS HARDWARE ASSEMBLY & C/O HARDWARE ASSEMBLY & C/O HARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING	S (EST HA	******** *****************************	DEVEL ENGR. 3.727 0.729 0.00 0.174 0.059 0.00 0.036	0. 0. 0.	ARE
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (\$M) SUSSYSTEM HARDWARE SUBTOT GREZOUSCONZOIVEN COST (\$M) SUBCONZGIVEN (\$1-850) SUS HARDWARE ASSEMBLY & CZO MARDWARE ASSEMBLY & CZO MARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING DATA	S (EST HA	******** *****************************	DEVEL ENGR. 3.929 0.729 0.00 0.00 0.031 0.031 0.031 0.230		ARE
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (\$M) SUBSYSTEM HARDWARE SUBTOT GREZOUSCONZOIVEN COST (\$M) SUBCONZOIVEN COST (\$M) SUBCONZOIVEN COST (\$M) SUPPORT COST (\$M) SYSTEM ENGINEERING 3 INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING DATA PROGRAM MANAGEMENT	S (EST HA	**************************************	DEVEL ENGA. 3.929 0.729 0.00 0.074 0.050 0.031 0.031 0.031 0.031	0. 0. 0.	ARE
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (\$M) SUBSYSTEM HARDWARE SUBTOT GEFOURCH/CIVEN COST (\$M) SUBCON/GIVEN (\$1-850) SUS HARDWARE ASSEMBLY & C/O HARDWARE ASSEMBLY & C/O MARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SUFFURACE ENGINEERING SYSTEMS FLIGHT TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM STARES LIAISON ENGINEERING DATA PROGRAM MANAGEMENT SUPPORT EFFORT SUBTOTAL (\$100)	S (EST HA	**************************************	DEVEL ENGR. 3.929 0.729 0.0 0.174 0.058 0.0 0.031 0.031 0.031 0.031 0.031	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	ARE 664 684 684 684 684 684 684 684 684 684
	TITLE: NATERIALS EXFOSURE LAB (S HARDWARE SUBSYSTEM COST (\$M) SUBSYSTEM HARDWARE SUBTOT GREZOUSCONZOIVEN COST (\$M) SUBCONZOIVEN COST (\$M) SUBCONZOIVEN COST (\$M) SUPPORT COST (\$M) SYSTEM ENGINEERING 3 INTEGRAT SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT SYSTEMS GROUND TEST CONDUCT SYSTEMS FLIGHT TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM SPARES LIAISON ENGINEERING DATA PROGRAM MANAGEMENT	S (EST HA	**************************************	DEVEL ENGA. 3.929 0.729 0.00 0.074 0.050 0.031 0.031 0.031 0.031	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	ARE
	TITLE: MATERIALS EXFOSURE LAB (S MARDWARE SUBSYSTEM COST (\$M) SUBSYSTEM HARDWARE SUBTOT GEFOURCH/CIVEN COST (\$M) SUBCON/GIVEN (\$1-850) SUS HARDWARE ASSEMBLY & C/O HARDWARE ASSEMBLY & C/O MARDWARE SUBTOTAL (\$M) SYSTEM ENGINEERING & INTEGRAT SUFFURACE ENGINEERING SYSTEMS FLIGHT TEST CONDUCT PECULIAR SUPPORT EQUIPMENT TOOLING & SPECIAL TEST EQUIPM STARES LIAISON ENGINEERING DATA PROGRAM MANAGEMENT SUPPORT EFFORT SUBTOTAL (\$100)	S (EST HA	**************************************	DEVEL ENGR. 3.929 0.729 0.0 0.174 0.058 0.0 0.031 0.031 0.031 0.031 0.031	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	ARE 664 684 684 684 684 684 684 684 684 684

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PAYLOAD ELEMENT HAME CODE PRECISION OPTICAL SYSTEM (LSS-4) BACX2036	TYPE Science and Applications (Hon-comm.) Commercial
COLTACT Hame RICHARD GATES Address BOEING AEROSPACE CO PO BOX 3999 SEATTLE, UA 98124	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone 206/773-2020 STATUS	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
() Operational () Approved () Planned (%) Candidate () Opportunity	Scale = 10
Desired First Flight, Year: 2000 Number of Flights 1 Duration	of Flight, Days 365
LARGE APERTURE IR ASTRONOMY FACILITY AND LARGE SPACE STRUCTURES TECHNOLOGY DEMONSTRATION MISSION (DEPLOYMENT AND ASSEMBLY, ASSEMBLY OF MIGH-PRECISION RIGID STRUCTURE, SUBSYSTEM INSTALLATION AND CHECKOUT, PRECISION CONTROL OF LSS, ADAPTIVE OPTICS, DEMONSTRATE MAN'S ROLE AND CAPABILITIES, SYSTEM IDENTIFICATION, SEGMENTED HIRRORS).	
DESCRIPTION THIS IS A LARGE ARBIENT IR TELESCOPE THAT IS ASSEMBLED FROM MODULES (PRIMARY MIRROR SECONDARY MIRROR ASSEMBLY, INSTRUMENTATION MODULE, SOLAR ARRAYS, RADIATORS, PITAINES, ETC.). AFTER ASSEMBLY, SYSTEM TESTS, TECHNOLOGY DEMO TESTS, ETC, ARE COMPLETED TO COULD BE TRANSFERRED TO AN ORBITAL POSITION WHERE IT WOULD THEN BE REMOTELY OPERATED FROM STATION.	ROPULSION THIS TELESCOPE
THIS IS A LARGE ARBIENT IR TELESCOPE THAT IS ASSEMBLED FROM MODULES (PRIMARY MIRROR SECONDARY MIRROR ASSEMBLY, INSTRUMENTATION MODULE, SOLAR ARRAYS, RADIATORS, PITANKS, ETC.). AFTER ASSEMBLY, SYSTEM TESTS, TECHNOLOGY DEMO TESTS, ETC, ARE COMPLETED TO COULD BE TRANSFERRED TO AN ORBITAL POSITION WHERE IT WOULD THEN BE REMOTELY OPERATED FOR	ROPULSION THIS TELESCOPE
THIS IS A LARGE ARBIENT IR TELESCOPE THAT IS ASSEMBLED FROM MODULES (PRIMARY MIRROR SECONDULES, SECONDARY MIRROR ASSEMBLY, INSTRUMENTATION MODULE, SOLAR ARRAYS, RADIATORS, PRIMARY, ETC.). AFTER ASSEMBLY, SYSTEM TESTS, TECHNOLOGY DEMO TESTS, ETC, ARE COMPLETED TO COULD BE TRANSFERRED TO AN ORBITAL POSITION WHERE IT WOULD THEN BE REMOTELY OPERATED FROM THE STATION. ORDIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No	ROPULSION THIS TELESCOPE ROH A GROUND OF POOR
THIS IS A LARGE ARBIENT IR TELESCOPE THAT IS ASSEMBLED FROM MODULES (PRIMARY MIRROR SECONDARY MIRROR ASSEMBLY, INSTRUMENTATION MODULE, SOLAR ARRAYS, RADIATORS, PITAMIS, ETC.). AFTER ASSEMBLY, SYSTEM TESTS, TECHNOLOGY DEMO TESTS, ETC, ARE COMPLETED TO COLD BE TRANSFERRED TO AN ORBITAL POSITION WHERE IT WOULD THEN BE REMOTELY OPERATED FROM THE PROPERTY OF THE PROPER	ROPULSION THIS TELESCOPE ROH A GROUND OF POOR

SPECIAL CONSIDERATIONS/See instructions

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Boeing-Specific Input Data
                                                       OPS CODE
HISSION TYPE
   Free Flyer

{ } Hot Serviced
{ Remote THS
                                                           FT
        Remote Hanned
                                                           Fil
    (X) Serviced at Station (THS Retrieved)
(Serviced at Station (Self-propelled)
                                                           FST
                                                           FS
    Platform Eased
      ) Not Serviced
                                                           PT
Ph
        Remote THS
Remote Hanned
        Serviced at Station (THS Retrieved)
                                                           PST
    ( ) Serviced at Station (Self-propelled)
                                                           PS
   Other
     ) Space Station Based
                                                           SS
    ( ) Sortie
                                                           SOR
                                                                                                                                                 OF POOR QUALITY
CONSTRUCTION/SERVICING COMPLEXITY
      ) Low
        Hedium
    (x) High
Operations Times
   OTV Up/Down
                                            days
   OTV or The on Orbit
                                            days
                                        365 days/year
    IVA Service
                                        10 man-days/year
                                        23 man-days/year
10 man-days/year
2 times/year
    EVA Service
   Experiment Ops
Service Frequency
Delta Velocities
   Up
   Acro Leturn
Support Equipment
                                                                                          Height:
                                                                                                                             (Stoved)
(Deployed)
                Length:
                             2.5
                                     meters
                                                     Width:
                                                                 2.5
                                                                        meters
                                                                                                               meters
                Length:
                            26
                                                                  12
                                                                                                      3.5
                                     meters
                                                     Width:
                                                                        meters
                                                                                                               meters
                           2000
                Mass:
                                     kg
Manifest Restrictions
    (I) No Restrictions
   Only with compatible payloads
Fly-Alone
Hust have Docking Hodule
Length of Pear Fab
Bumbes of Modules Required to Assemble the Payload
                                                                      62
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- - - FRICE 84 - - - ELECTRONIC ITEM

DATE 7-MAR-83

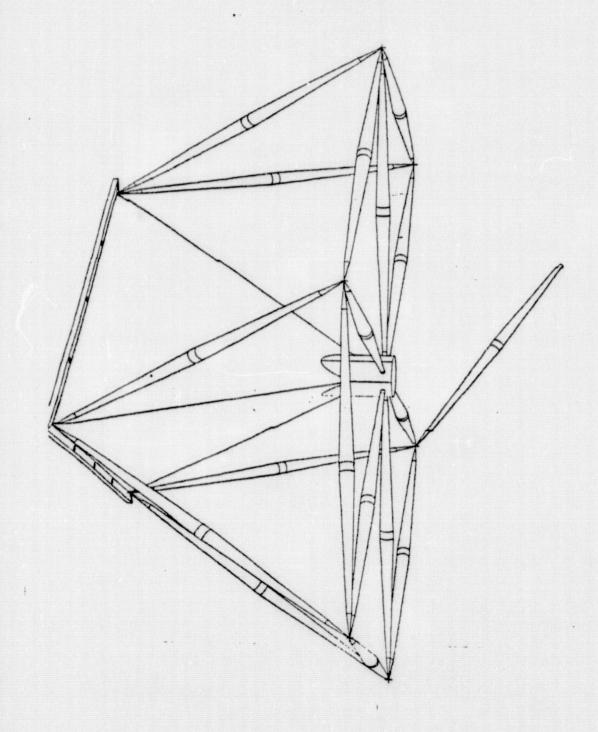
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PRECISION OPTICAL SYSTEM

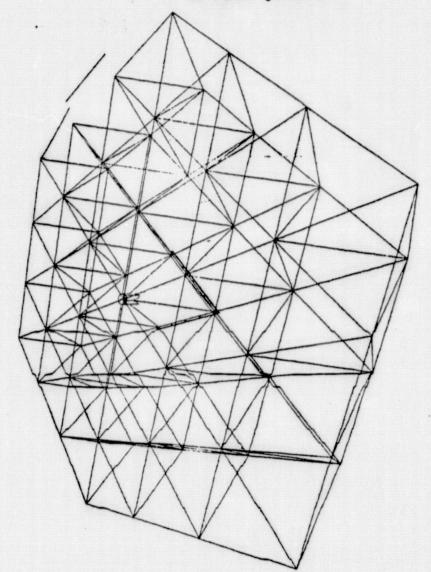
PROTOTYPE QUANTITY	3.000		WEIGHT VOLUME	2880.00 86.00	MODE QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELO	PMENT	PRO	DEUCTION	TOTAL COST	
ENGINEERING						
DRAFTING	57	02.			5702.	
DESIGN	185	65.		-	18565.	
SYSTEMS	33	94.		-	3394.	
PROJECT MGMT	116	71.		-	11671.	
DATA	13	21.		-	1321.	
SUBTOTAL (ENG)	406	54.		-	40654.	
MANUFACTURING						
PRODUCTION		-			-	
PROTOTYPE	262	79.			26279.	
TOOL-TEST EQ	141	23.		-	14123.	
SUBTOTAL (MFG)	404	02.		-	40402.	
TOTAL COST	810	55.		_	81055.	

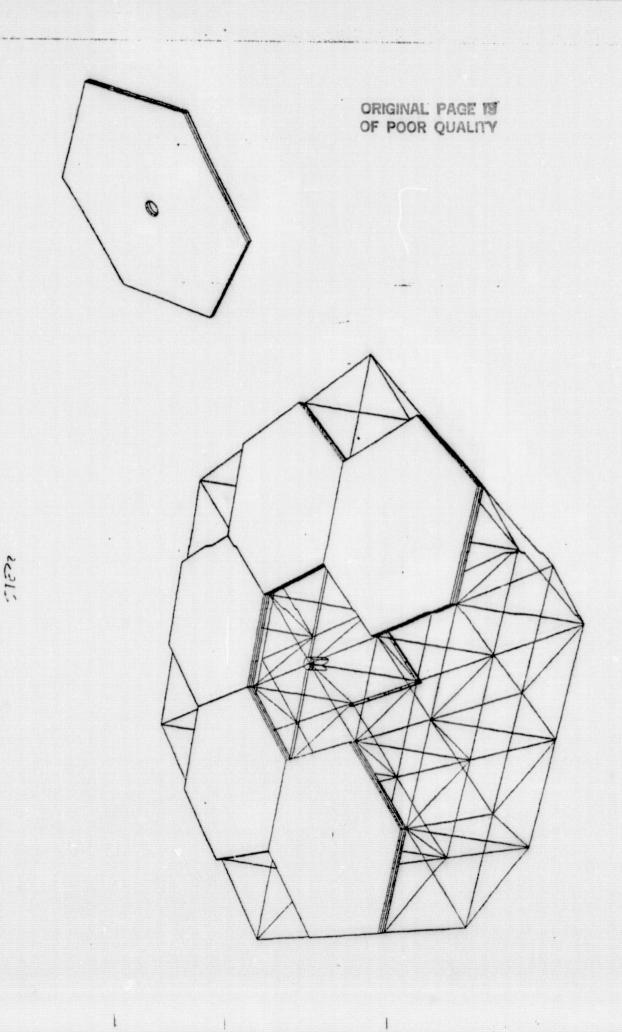
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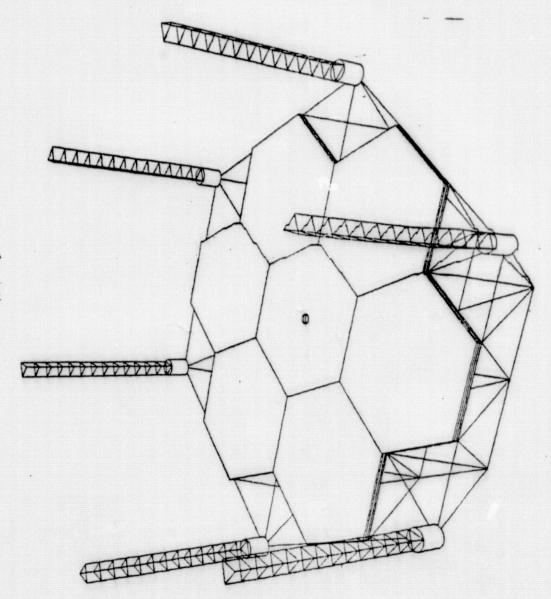
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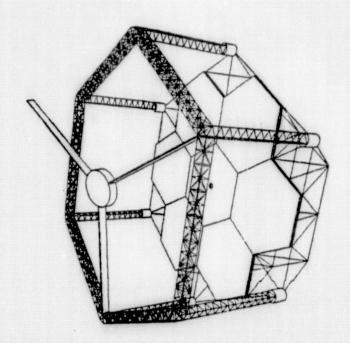


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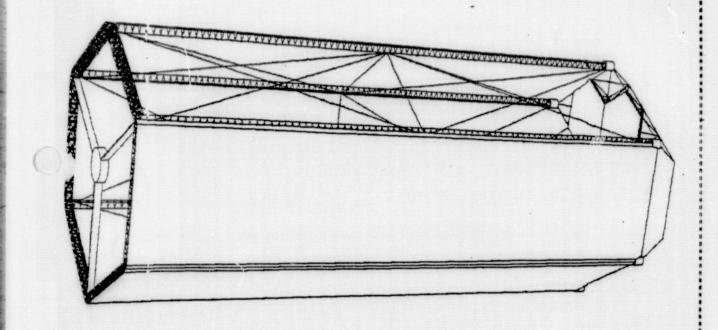
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DATE 7-MAR-83		TIME (283)		FILENA	ME: REID2.DAT	
PRECISION OPTICAL SYSTEM			,			
PROTOTYPE QUANTITY	3.000		WEIGHT VOLUME	1880.00 84.00	MODE QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELO	PMENT	FR	GBUCTION	TOTAL COST	
ENGINEERING						
DRAFTING	57	02.			5702.	
DESIGN	185	65.			185a5.	
SYSTEMS	33	94.		-	3394.	
PROJECT MGMT		71.		_	11671.	
DATA		21.		-	1321.	
SUBTOTAL (ENG)		54.			40654.	
MANUFACTURING			.,			
PRODUCTION		-				
PROTOTYPE	262	79.		- ,	26279.	
TOOL-TEST EQ	141				14123.	
SURTQTAL (MFG)		02.		-	40402.	

81055.

TOTAL COST

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	FEEGIN	Girab Limit			
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. Edialum Dations Syst	En				
YTITHAUD BALTCTOR			1880.00	AGDE "GUANTITY AN	in i
	DEVELOPMEN	T FRO	BUCTION	TOTAL COS	
	5702. 18565. 3394.			5702. 18545. 3374.	
PAGUECT HGMT DATA SUBTOTAL(ENG)	11471.			11471. 1321. 43454.	
HARDFACTURING THESDECTION PROTOTYPE	26279.			25279.	
FOTAL COST	14123. 40402. 81055.			14123. 40401. 81053.	
-111GH FACTORS ELE	CTRONIC MECHANI 0.000* 2830.00 3.700 32.70 0.313 8.43 0.500 0.75 0.500 0.000	0 EN 7* PA 0 PR 0 EL 0 PL YAR AELIBIL	GIMEERING S OTGTYPE SUR OTG SCHEDUL EUT VGL FRA ATPORA OF TECNOLUS IT: FATOR	TORS TORS TORS FORT E FACTOR ACTION 2 1787*	.800 .3 .256* .013*
CHECLE START DVELOPMENT AN 8 JOPESCHOFTSONOMERSATIO SCILLATIO TOTAL TOTAL	7 (11) OV	BT IEM B7* (10) TGGLIB	FIGIA	1234# * (21) CTOR3	
*******	DEVLOPMENT	PRODUCTIN	otal		

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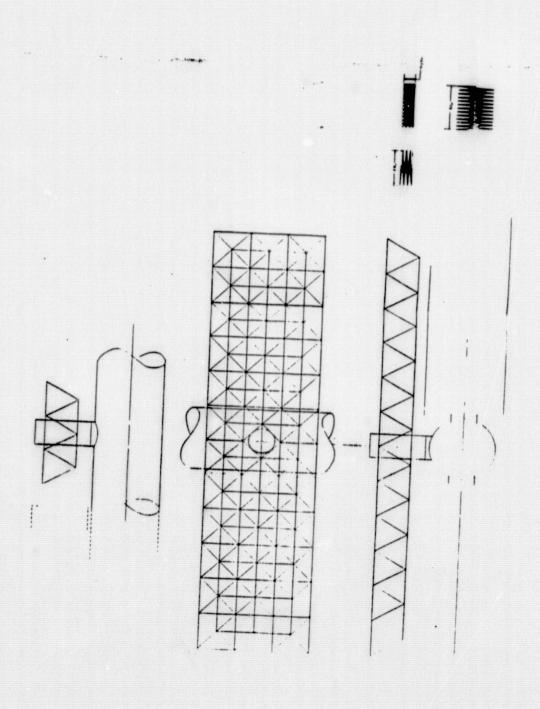
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PAYLOAD ELEHENT NAME COURT & STORAGE FAC (LSS-1) CONTACT Name RICHARD GATES Address BOEING AEROSPACE CO PO BOX 3999 SEATTLE, WA 98124	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone 206/773-2020	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital
Desired First Flight, Year: 1991 Number of Flights 1 Duration	n of Flight, Days 365
OBJECTIVE LARGE SPACE STRUCTURES TECHNOLOGY DEMONSTRATIONS (DEPLOYMENT AND ASSEMBLY, SUBSYSTEM INSTALLATION AND CHECKOUT, DEMONSTRATION OF MAN'S ROLE AND CAPABILITIES IN SPACE). FOLLOWING THE TDM, THIS STRUCTURE WILL SERVE AS A PERMANENT SPACE STATION FACILITY.	
DESCRIPTION THE CONSTRUCTION AND STORAGE FACILITY IS A LARGE PLANAR, DEPLOYABLE TRUSS ATTACHED TO THE SPACE STATION AT A BERTHING PORT. ADDITIONAL STRUCTURAL SUPPORT STRUCTURES WILL ATTACHED TO PROVIDE STRUCTURAL ATTACHMENTS FOR PAYLOADS AND OTHER MODULES TRANSPORTED STATION VIA STS.	LL BE TO THE SPACE OF POOR ORIGINAL
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Ilodal Angle, deg Any Escape dV Required, m/s	AGE IS
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg)	
POWER () AC () DC Power, W Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00 (X) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

() Encription/Decription () Uplink Required: Comma () On-Board Data Processi	mand Rate (KBS): 0 ng Required		Frequency (1Mz	0.00			
Description: Data Types: () Anal Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit	0		Hours/Day Voice (Hours/D Other:	0.00 0.00			
Data Dump Frequency (P Recording Rate (KBPS)	er Orbit) 0		Downlink comma Downlink Frequ		0.00		
THERMAL () Active (X) Passive Temperature, deg C 0 N Heat Rejection, W 0	perational Minimum on-operational Minimum perational Minimum	0 0 0	Haximum Maximum Haximum Maximum	0 0 0			
, u	on-operational Minimum						
QUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass	STICS (X) External (Pressurized 2.50 meters Width: 26.00 meters Width: kg: 2000	() R (X) U 2.50 12.00 Retur	emote npressurized meters meters n mass, kg: 0E+00 max:	Height: Height: 0.00E+00	1.00 meters 3.50 meters	(Stowed) (Deployed)	OF P
QUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Launch mass Consumable Acceleratio	STICS (X) External (Pressurized 2.50 meters Width: 26.00 meters Width: kg: 2000	() R (X) U 2.50 12.00 Retur	npressurized meters meters n mass, kg:	Height:		(Stowed) (Deployed)	OF POOR
QUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External () Pressurized 2.50 meters Width: 26.00 meters Width: x, kg: 2000 Types n Sensitivity, (g)	() R (X) U 2.50 12.00 Retur	npressurized meters meters n mass, kg: 0E+00 max:	Height:		(Stowed) (Deployed)	OOR
QUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External (Pressurized 2.50 meters Width: 26.00 meters Width: yes 2000 Types n Sensitivity, (g) Task Assignments	() R (x) U 2.50 12.00 Retur min: 0.0	npressurized meters meters n mass, kg: 0E+00 max:	Height:		(Stowed) (Deployed)	OOR
EQUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External (Pressurized 2.50 meters Width: 26.00 meters Width: (Kg: 2000) Types (Mark Assignments) Skill 11 Level 3 Hours/Day 0.00	() R (x) U 2.50 12.00 Retur min: 0.0	npressurized meters meters n mass, kg: 0E+00 max: 13 3 0.00	Height: 0.00E+00		(Stowed) (Deployed)	OOR
EQUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External () Pressurized 2.50 meters Width: 26.00 meters Width: () kg: 2000 Types () Sensitivity, (g) Task Assignments Skill 11 Level 3	() R (x) U 2.50 12.00 Retur min: 0.0	npressurized meters meters n mass, kg: 0E+00 max: 13 3 0.00	Height: 0.00E+00		(Stowed) (Deployed)	OF POOR QUALITY

Boeing-Specific Input Data OPS CODE MISSION TYPE Free Flyer
() Not Serviced
() Remote THS F FT Remote Manned FM Serviced at Station (TMS Retrieved) Serviced at Station (Self-propelled) FST FS Platform Based Not Serviced PT Remote TMS Remote Manned Serviced at Station (TMS Retrieved) Serviced at Station (Self-propelled) PM PST PS Other
(X) Space Station Based
() Sortie SOR CONSTRUCTION/SERVICING COMPLEXITY (X) Low Medium () High Operations Times OTV Up/Down 0 days 0 days 365 days/year 10 man-days/year 20 man-days/year OTV or THS on Orbit Mission Use IVA Service EVA Service 20 man-days/year 4 times/year Experiment Ops Service Frequency Delta Velocities Up Down Aero Return Support Equipment (Stowed) (Deployed) .50 meters 1.00 meters .50 meters Height: Height: Width: Width: Length: Length: 1.00 meters 3.00 meters 100 kg Mass: Manifest Restrictions (X) No Restrictions Only with compatible payloads
Fly-Alone
Hust have Docking Module 0.00 Length of Beam Fab 120 Humber of Appendages Humber of Fodules Required to Assemble the Payload

ORIGINAL PAGE IS



ORIGINAL PAGE 19 OF POOR QUALITY

TY PCHETY SPACEL PCHOUT

START 5

REVISION NINE (15 FEBRUARY 1982)

EASE SPACE STATION HARDWARE (DEV) DWRAF 60 95 130 50 120 60 30 15 ASHPORT 1 .3 1 .5 BSUFFORT 5 .2 1 1 1 HEIGHT 0 0 5 2860 SCHEDULE 0 0 FINAL 1 0 FLIGHT 0 0 TOOLING 1 SPARES 10 SETS 1 2010 CLASS 0 HILL 1 DEV

*** PCH MODEL REVISION NINE

18 FEB 1983 ***

ENGINEERING ***** ENGINEERING ****** ENGINEERING ****** ENGINEERING

SCOSSOSS HILLIONS SCOSSOSSES TARRESTERS SCEING FEATHERS SUB/OFE DESIGN DEV SHOP DES 1 SHOP HOURS HOURS DELLARS TOTAL

BI STRUCTURE -- SPACE PLATFORM M7 SPACE PLATFORM 3840 S 1.2 0 0

289531. 84859. 25.623

END aFG

> *** PCM MODEL REVISION NINE 1d FEB 1983 ***

MANUFACTURING SALE MANUFACTURING SALE MANUFACTURING SALE MANUFACTURING SALE MANUFACTURING SALES SALES

******** BOEING SUB/OFE ******** MILLIONS ******* B.F.L. G.C. MANUFACTUR HOURS HOURS TOLLARS

STRUCTURE--SPACE PLATFORM

74872, 11531.

AND HARDWARE ASSEMBLY & CHECKOUT 0 3 0 0 3985. 598. 0.548

*** PCM MODEL REVISION NINE 18 FEB 1753 ***

*** BOEING *BGEING ** FCM HOURS SUMMARY HOURS FLM ** BCEING ****

TITLE: SPACE STATION HARDWARE (DEU)

BOEING HARDWARE SUBSYSTEM HOURS DEV SHOP B.F.L. DESIGN 0.0. 50000 10857 12129 31 STRUCTURE -- SPACE PLATFOR 289231 20957 12:29 80057 SUEING SUBTOTAL 289531

HARDWARE ASSEMBLY & C/O 13948

- me 40 .. Por 5 . - m. 2 . - m. 2

BOEING SUPPORT HOURS SOFTWAKE ENGINEERING

:2388

ORIGINAL PAGE 19 OF POOR QUALITY

	*******************************	***********
	# BOEING DESIGN & DEV SHOP HOURS	376300 €
	* BOEING HARDWARE BFL & GC HOURS	104900 1
	* BOEING SUPPORT HOURS	313900 *
	•	*
	* BOEING PROGRAM HOURS (NOMINAL SCHEDULE)	797200 \$
	•	*********

***	PCH MODEL REVISION NINE 13 FEB 1983 ***	

me 10

TITLE: SPACE STATION HARDWARE (DEV)

	-DEVEL-	FAENTAL
	Cha.	MAFIWARE
HARDWARE BUBSYSTEH COST (\$H)		
51 STRUCTURESPACE PLATFORM	25.623	11.119
SUBSYSTEM HARDWARE SUBTOTAL (\$M)	25.623	11.115
OFE/SUBCON/GIVEN COST (##)		
	3.0	0.0
SUBCON/GIVEN (S1-S50) SUBTOTAL (\$M)	0.0	0.0
HARDWARE ASSEMBLY & C/O		1.468
HARDWARE SUBTOTAL (SH)		12.78e
SUPPORT COST (*M)		
SYSTEM ENGINEERING & INTEGRATION	2.834	
SOFTWARE ENGINEERING SYSTEMS GROUND TEST CONDUCT	1.003	
SYSTEMS FLIGHT TEST CONDUCT	0.0	
PECULIAR SUPPORT EQUIPMENT	0.748	1.025
TOOLING & SPECIAL TEST EQUIPMENT	• • • • • • • • • • • • • • • • • • • •	1.149
SPARES		1.112
LIAISON ENGINEERING	0.511	
DATA	1.591	
PROGRAM MANAGEMENT	6.303	1.444
SUPPORT EFFORT SUBTOTAL (\$H)	13.177	4.733
TOTAL (SH) (NOHINAL SCHEDULE)	43.822	17.518

PAYLOAD KLEHERT IN INTERPOLATOR DEVELOR CONTACT Inche Address FAR AI 1700 OI UESTOIL 1912U7	OP & TEST FACIL	CODE BACK2059		Type Science and Application Commercial (X) Technology Developm Operations Other Institute Security Type number (see table	aent
Telephone 416/745 STATUS () Operational	() Approved () Planned (X) Candid	late () Opportunity	Scale = 7	uld Use
Desired First Flig	ght, Year: 1991	Number of Fligh	ts 1 Duration	of Flight, Days 730	
TH SPACE		FOR TASKS & FUNCTIONS DATA ON REMOTELY PERFORMANTED THE LIAMIPULATORS DURING THE			
COLLECTED AND USER CONSTRUCTION, INST	VOLVING BERTHING, TO DEVELOP AND I PECTION, SATELLITE	MODULE INTERCHANGE, SA REFINE REQUIREMENTS FOR REPAIR & MATERIAL TRAN	SED UITH A SET OF TYPICAL PA TELLITE SERVICING. DATA ON MANIPULATORS FOR APPLICATION SEFER. TION TO CONDUCT PERFORMANCE	THESE TASKS WILL BE S IN SPACE	ORIGINAL P
OREIT CHARACTERIST Geosynchronous	PICS OF BELL () YOU	HODULE INTERCHANCE, SA REFINE REQUIREMENTS FOR REPAIR & MATERIAL TRAN- HABLE ON THE SPACE STA Perigee, kn	Tolerance + -	THESE TASKS WILL BE S IN SPACE	ORIGINAL PAGE 18
OLEIT CHARACTERIST Geosynchronous Apogee, km Inclination, de listes of Tasks II OLLECTED AND USEI CONTRUCTION STATE OF THE CONTRUCTION STATE OF THE CONTRUCT OF TASKS IN CONTRUCT OF THE CONTR	PECTION, SATELLITE SYSTEM WILL BE AVA FICS Orbit () Your control of the control	HODULE INTERCHANCE, SA EFFINE REQUIREMENTS FOR E REPAIR & MATERIAL TRAN HILABLE ON THE SPACE STA () No Perigee, kn) Inertial () Solar :-sec/sec	Tolerance + -	THESE TASKS WILL BE S IN SPACE	00
OLEIT CHARACTERIST Geosynchronous Apogee, km Inclination, de listes of Tasks II OLLECTED AND USEI CONTRUCTION STATE OF THE CONTRUCTION STATE OF THE CONTRUCT OF TASKS IN CONTRUCT OF THE CONTR	PICS () Your condition () You can be conditionally the condition () You can be conditionally conditi	HODULE INTERCHANCE, SA EFFINE REQUIREMENTS FOR E REPAIR & MATERIAL TRAN HILABLE ON THE SPACE STA () No Perigee, kn) Inertial () Solar :-sec/sec	TOLERANCE + Tolerance + Tolerance + Ephemeris Accuracy, m () Earth () Any	THESE TASKS WILL BE S IN SPACE	00

DATA/COLIMITICATIONS Lowitoring Requirements: () Hone () Realtime () Encription/Decription Red () Uplink Required: Con () On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Rours/Day): On-Board Storage (Rbit): Data Dump Frequency (Per Recording Rate (KEPS)	quired a and Rate (KES): Required () Digital 100.00 Orbit)	Frequency Hours/Day Voice (He Other: Downlink						ORIGINAL OF POOR
THERMAL (X) Active (X) Passive Temperature, deg C Oper Hon Heat Rejection, V Oper	rational Hinimum -operational Hinimum rational Einimum -operational Hinimum	llax llax	iaum Jaun Jaun Jaun					PAGE 19
Consumable Ty	.00 meters Vidth: .00 meters Vidth: kg: 2500	() Remote () Unpressur 1.00 meters 0.50 meters Return mass,	Height	: 2.00 : 0.50	meters meters	(Stoved) (Deployed)	
CREM REQUIREMENTS Crew Size	Task Assignments							
Shills (See Table B)	Skill 5	7	l	1'	1 1		1	
	Level 3	2 1 1	1	1	1 1	ı	1	- 1
	Hours/Day 8.00	3.00 .	1 /	1	I I	ı	1	
EVA (K) Yes () No	Reason EXTERNAL HANTI	PULATOR Lou	cs/EVA 240					
SERVICILE/HATHTHANCE Service: Configuration Changes:	Interval Returnables Interval Deliverables	kg lian	sunables Lours requir -Hours Requir urnables		kg			

		Poe	ing-Specific In	iput Data			
Free Flyer { } Hot Serviced { } Leaste THS { } Reaste Hanned { } Serviced at Station { } Serviced at Station	(THS Retrieved)	OPS CODE F FT FH FST FS					
Platform Based () Not Serviced () Remote The () Remote Harmed () Serviced at Station () Serviced at Station	(THS Retrieved) (Self-propelled)	P PT PM PST PS					
Other (%) Space Station Based (%) Sortie		SS					•
CONSTRUCTION/SERVICING COMP. LOV M. Hedium Migh	LEXITY						OF OF
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Emperiment Ops Service Frequency	0 days 0 days 730 days/year 20 man-days/ 40 man-days/ 90 man-days/ 4 times/yea	year					OF POOR QUALITY
Delta Velocities Up Povm Aero Return							38
Support Equipment Length: Length:	neters Wi	dth:	neters	Height: Height:	meters	(Stowed) (Deployed)	
Mass:	kg						
Manifest Restrictions (X) No Restrictions () Only with compatible () Fly-Alone () Rust have Docking No.	payloads dule						
Length of Beam Pab Humber of Angeldages Humber of Pocules Required		vload					

PAYLOAD ELEMENT HAME CODE SHOWER STATION PACK2060		Science and Applications (Non-cond
CONTACT		(X) Technology Development
Lane Address		Operations Other
		() National Security Type number (see table A) 14
		Importance of the Space Station to
Telephone		this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candid	ate () Opportunity	10 = Vital Scale = 8
Desired First Flight, Year: 1991 Number of Fligh	ts 1 Duratio	on of Flight, Days 365
OBJECTIVE TO PROVIDE THE TECHNOLOGY DEVELOPMENT AND DEMONSTRATION OF REQUIRED FOR PERSONAL SHOWER, WATER COLLECTION, RECYCLING	THE SYSTEM	
THIS HISSION WILL PROVIDE THE COMDITIONS NECESSARY FOR THE		DEMONSTRATION OF A
DESCRIPTION THIS HISSION WILL PROVIDE THE COMDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF SHOWER CLEANUP, AND SHOWER AREA HEATING REQUIREMENTS.		UATED DEMOVAL
THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS O		D DEMONSTRATION OF A ORIGINAL, WATER REMOVAL,
THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS O		POOR
THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF		POOR
THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF SHOWER CLEANUP, AND SHOWER AREA HEATING REQUIREMENTS.		POOR
THIS HISSIGH WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF SHOWER CLEANUP, AND SHOWER AREA HEATING REQUIREMENTS. ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, kn	Tolerance +	O DEHONSTRATION OF A OF POOR IGINAL PAGE 19
THIS HISSION WILL PROVIDE THE CONDITIONS NECESSARY FOR THE ZERO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF SHOWER CLEANUP, AND SHOWER AREA HEATING REQUIREMENTS. ORBIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) No	F SOAP AND WATER APPLICATION	POOR
ORBIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) No Apogee, kn Inclination, deg Hodel Angle, deg Escape dy Required, m/s POINTING/ORIENTATION	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
ORBIT CHARACTERISTICS Coosynchronous Orbit () Yes (X) No Apogee, kn Inclination, deg Hodal Angle, deg Escape dy Required, m/s POINTING/ORIELTATION View Direction Truth Sites (if known):	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
OREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, ku Inclination, deg Hodal Angle, deg Escape dy Required, m/s POINTING/ORIENTATION Vice Direction Truth Sites (if known): Pointing Accuracy, arc-sec	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
CREAT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, kn Perigee, km Inclination, deg Hodal Angle, deg Escape dy Eequired, m/s POINTING/ORIENTATION View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
OREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, kn Perigee, km Inclination, deg Hodal Angle, deg Escape dy Required, m/s POTHTHE/ORIELTATION View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
OREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, kn Inclination, deg Hodel Angle, deg Escape dv Required, m/s POINTING/ORIENTATION View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance) POUEL (X) DC Power, U Duration, Hrs/Day	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY
CREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, ku Inclination, deg Hodal Angle, deg Escape dy Required, m/s POTHTHIC/ORIELTATION View Direction Truth Sites (if known): Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	Tolerance + Tolerance + Ephemeris Accuracy, m	POOR QUALITY

DATA/COMMUNICATIONS Locatoring Requirements: A hone () Encription/Decription Re () Uplink Required: () On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): Gn-Board Storage (Rbit) Data Dump Frequency (Per Recording Rate (KBPS)	equired pundand Rate (KDS prequired pundand (C) Digita	G):			Hou Voi Oth Dow	nlink com	Day):				OF POOR QUALITY	
THERMAL () Active () Passive	erational Hinim n-operational Hi erational Hinim n-operational Hi					Haximum Haximum Haximum Haximum					UALITY .	id id
EQUIPMENT PRYSICAL CHARACTERIST Location (X) Internal Equipment ID/Function Length: Length: Launch mass, Consumable T	1.50 meters 1.50 meters kg: 25	T.	lidth:	R	1.50 m	essurized eters	Height: Reight:	1.50 m 1.50 m	eters eters	(Stowed) (Deploye		
CREW REQUIREMENTS Crew Size	Task Assigm	ient	s									
Skills (See Table B)	Skill	1	1	1	1	<u>-</u>	1 1		1	ı	I	ī
	Level	1	1	1	1	ı	1 1	1	1	1	- I	ī
	Hours/Day	1	0.50	1	1	1.	1 . 1	1	ī	ı	ı	1
EWA () Yes (K) No	Reason					Hours/EV	Α					
SERVICTES/: ATHTEMANCE	Interval Returnables				days ka	Consumab Han hour	s required	1	8			
Configuration Changes:	Interval Deliverable	5			days kg	Han-Hour Returnab	s Required les	1	8			
SPECIAL CONSIDERATIONS/See inst	tructions											

DESCRIPTION THIS HISSION WILL PROVIDE THE COMDITIONS NECESSARY FOR THE TECHNOLOGY DEVELOPMENT AND DEMONSTRATION OF A CHRO-GRAVITY SHOWER. TESTS WILL ASSESS THE EFFECTIVENESS OF SOAP AND WATER APPLICATION, WATER REMOVAL, CHOWER CLEANUP, AND SHOWER AREA HEATING REQUIREMENTS.

Item Dry Weight: 150 pounds

Volume:

Cost Data

20.00 cubic feet

Structural Veight (includes typical "mechanical" items listed below): 120.00 pounds

Design Complexity:

Lanufacturing Complexity for Structural/Mechanical Items: 5
Typical "mechanical" items include enclosures, optics, motors, blowers, gyros, batteries, cables, connectors, switches, indicators, cathode ray tubes, antennas without electronics, mechanisms, waveguides, etc.

Electronic Equipment Description:

Power Supplies Other

Manufacturing Complexity for Electronic Items:

Weight of the Circuit Board and Electronics Mounted on it:

4.00 pounds

Material Used for the Enclosure: STAINLESS

Machine Casting? No

Of the electronics weight, what % is off-the-shelf?

Of the sturctural weight, what % is off-the-shelf?

Hanufacturing Degree of Automation

Electronics Hechanical { } Low

Is the item Hardened? No

OF POOR QUALITY

- - - PRICE 84 - - ELECTRONIC ITEM

DATE 4	-MAR-	83
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TIME 10:48 (283010) FILENAME: REID. DAT

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FROTOTYPE QUANTITY		T WEIGHT 150.00 T VOLUME 20.00	HODE GUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST	
ENGINEERING				
DRAFTING	472.	-	472.	
DESIGN	1670.		1670.	
SYSTEMS	389.	 Turbe part open site at the first open 	389.	
PROJECT MGMT	643.		643.	
DATA	82.		82.	
SUBTOTAL (ENG)	3257.		3257.	
MANUFACTURING				
PRODUCTION	-		-	
, PROTOTYPE	414.		414.	
TOOL-TEST EQ	308.		308.	
SUBTOTAL (MFG)	722.	•	722.	
TOTAL COST	3979.	-	3979.	

TRASH HAMAGELERIT BACK2061	TYPE () Science and Applications (Non-cons.
CONTACT Heise	(X) Technology Development () Operations
Address	Other National Security Type number (see table A) 14
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate	() Opportunity Scale = 6
Desired First Flight, Year: 1997 Humber of Flights	Duration of Flight, Days 365
OBJECTIVE THE TECHNOLOGY BASE FOR WASTE MANAGEMENT SYSTEMS REPORT PERIAMENT HABITABILITY.	EQUIRED
DESCRIPTION THIS HISSIGN WILL PROVIDE THE CONDITIONS DECESSARY FOR THE TE APPLIANCES AND DISINFECTANTS REQUIRED FOR TRASH DISPOSAL AND CAN BE DEVELOPED AND ACCORDANTED ON THE INITIAL MODULE FOR COUT THE EVOLUTIONARY GROWTH CONFIGURATION.	CLEARLINESS IN THE SPACE STATION. THIS MISSION
	OR C
ORDIT CHARACTERISTICS Coosynchronous Orbit () Yes (X) No Apogee, km Inclination, deg Nodal Angle, deg Escape dV Required, m/s	Tolerance + - CALITY Tolerance + - Toleranc
Apogee, km Perigee, km Inclination, dec	Tolerance + - III

PATA/COLIMITICATIONS L'ouitorin, L'equirements: Aone () Realtime () Encription/Decription E.	() Offline		()(the	 r:								
() Encription/Decription P. () Uplink Required: Co () On-Fourd Data Processing Description:	equired ormand Rate (KI C Required					quency (1	ma):				9	OR OR	
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Roard Storage (Hbit)	g () Digit	al				rs/Day ce (Hour: er:	s/Day):				-	ORIGINAL POOR	
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit)						mand rate					PAG	
THERIAL (X) Active (X) Active (X) Active (X) Passive (X) Passive	erational Hinia n-operational H erational Hinia n-operational H	un lini un	iaun iaun	2	00	Haximu Haximu Haximu Haximu	n n					- ALI	
Length: Launch mass, Consumable Ty	(X) Pro 1.54 meters 1.50 meters kg:		Widtl	l n: n: mi	1.54 m 1.50 m Return m	essurized eters eters ass, kg:	d Height Height	:	1.54 met	ers ers	(Stoved) (Deploye	ed)	
CREU REQUIREMENTS Creu Size	Task Assign	men	its										
Skills (See Table B)	Skill	1	1	1		. 1	1	1	- -	1	1	1	1
	Level	1	1	1	ī	ī	ı	1	1	ı	1	1	ī
	Hours/Day	1	1.00	1	ı	ı	1 .	1	1	1	1	ī	1
EVA () Yes (X) No	Reason					llours/	CAV						
SERVICIUC/IZINTENANCE	Interval Returnables				days kg		ars requir		0.25 kg				
Configuration Changes:	Interval Deliverable	s			days kg	Returns	urs Requir ables	ed	kg				

SPECIAL CONSIDERATIONS/See instructions

--- PRICE 84 -- ELECTRONIC ITEM

DATE 4-MAR-83		10:48 3010)	FILENA	ME: REID.DAT	
TRASH MANAGEMENT					
	INU	T WEIGHT	100.00	MODE	1
PROTOTYPE QUANTITY	3.000 UNI	T VOLUME	6.00	QUANTITY/NHA	1
BEGGEAN COOTA 1000)	DELIEL ORMENT		ODUCTION	TOTAL COST	
PROGRAM COST(\$ 1000)	DEVELOPMENT	rk	ODOCITON	TOTAL CUST	
ENGINEERING	107			197.	
DESIGN DESIGN	197. 628.			628.	
SYSTEMS	90. 320.			90. 320.	
PROJECT MGMT	40.			40.	
SUBTOTAL (ENG)	1274.			1274.	
MANUFACTURING					
PRODUCTION	_		-		
PROTOTYPE	300.		-	300.	
TOOL-TEST EQ	198.		-	193. '	1
SUBTOTAL (MFG)	499.		-	499.	
TOTAL COST	1773.			1773.	

OF POOR QUALITY

PAYLOAD ELECTRIC MARE PROP TRANSFER TECH DERIO (OTV-1) CGRTACT Rane Address CGRIVATE BIVISION	TYPE Science and Applications (Non-court) Commercial Technology Development Operations Other National Security Type number (see table A) 15
Telephone STATUS () Operational () Approved () Planned (X) Candidate ()	Importance of the Space Station to this Element 1 = Lov Value, But Could Use 10 = Vital Opportunity Scale = 10
Desired First Flight, Year: 1992 Number of Flights	Duration of Flight, Days 180
OBJECTIVE OTV SERVICING TECHNOLOGY DEMONSTRATIONS: ZERO-G, NO-LEAKAGE CRYOGE COMMECTORS; CHILLDOWN OF FLUID TRANSFER LINES; CHILLDOWN OF RECEIV TANK; TRANSFER TO OTV TANK; DISCONNECTS.	TIC ER
DESCRIPTION THIS HARDWARE FOR THIS TON WOULD BE INTEGRATED WITH THE OTV PROPEL THE HARDWARE WILL CONSIST OF CRYOGENIC LINE CONNECTORS, CONTROLS,	PUNPS, ETC. UTILIZE LII2 AS TEST CRYO. OF POOP POOP
Inclination, des 28.5 Tol	erance + - OVALITY erance + - Emeris Accuracy, m
Truth Sites (if known):	Earth (X) Any 1d of View (deg)
Operating 1000 (X) DC Duration, Ers/Day Operating 1000 (X) Co Standby Peck Voltage, V Frequency, Es	ut intous

() Encription/Decription Requ () Uplink Required: Common	and Rate (KLS lequired () Digita	:):	Othe	r:	Hou Voi Oth Dow	nlink com					ORIG OF F	
THERMAL (X) Active () Passive Temperature, deg C Opera Hon- Heat Rejection, W Opera	ational Hiniau operational Hi ational Hiniau operational Hi	nimun				Maximum Maximum Maximum Maximum					OF FOOR QUAL	
EQUIPMENT PHYSICAL CHARACTERISTIC	CS () Exte	rnal		()	Reno	 te					70	
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, kg Consumable Type Acceleration S	(X) Pres l meters meters 1 1064	Wid	th: th:	Rei	.00 10	essurized eters eters ass, kg:	Height: Height:		meters meters	(Stoved) (Deployed)		
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, Eg Consumable Type	(X) Pres l meters meters 1 1064	Vid Vid	th: th:	Rei	.00 10	eters eters ass, kg:	Height: Height:	3.40 3.40				
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, kg Consumable Type Acceleration Se	(X) Pres	Vid Vid	th: th:	Rei	.00 10	eters eters ass, kg:	Height: Height:	3.40				
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, kg Consumable Type Acceleration Se CREW REQUIREMENTS Crew Size 2	(X) Pres	Wid Wid () ents	th: th:	Rei	.00 10	eters eters ass, kg:	Height: Height:	3.40 3.40				
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, kg Consumable Type Acceleration Se CREW REQUIREMENTS Crew Size 2	(X) Pres l meters 2: 1064 es ensitivity, (g Task Assigna	Wid Wid	th: th:	5. Ref	.00 m	eters eters ass, kg:	Height: Height:	3.40 3.40			 	
Equipment ID/Function Length: 7.1 Length: 7.1 Launch mass, kg Consumable Type Acceleration Se CREW REQUIREMENTS Crew Size 2	(X) Pres	Vid Vid	th:	11 3	00 m	eters eters ass, kg:	Height: Height:	3.40 3.40			 	

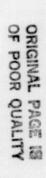
SPECIAL CONSIDERATIONS/See instructions INTEGRATE THIS TON UTTH FACE2064.

Length of Beam Fab Eurber of Appendages Humber of Edules Required to Assemble the Payload 1

PROP TRANSFER 2063

EVA Perform visual inspection Connect umbilicals Check power Connect transfer lines Check seals Check Data & video Monitor supply tank Mass Gaging Chill down transfer lines monitor temp chill time Chill down receiving tank monitor temp chill time Open transfer valves Monitor supply tank mass gaging venting sloshing pressurization temperature liquid vapor mix Monitor transfer lines pressure transients temperature flow rates venting Monitor receiving tank temperature mass gaging propellant present liquid vapor mix venting

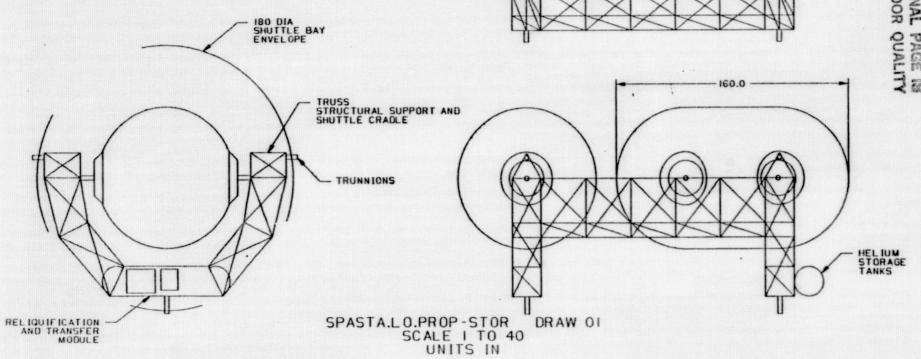
sloshing
pressure
fill time
Close transfer valves
Monitor temp and venting
Disconnect lines umbilical



CRYOGENIC PROPELLENT STORAGE AND TRANSFER CAPABLE OF TRANSFERING PROPELLENT BETWEEN TANKS AND TO OTV. CONTAINS INSTRUMENTATION TO MONITOR STATUS OF ALL PHASES OF TRANSFER

WEIGHT SUMMARY TANK AND 2060 STRC (DRY) RELIQ AND 305 TRANS MOD 2060 305 TOT

2365



88 ID 206 FT3 RECIEVER TANK

270.0

88 ID 442 FT3 SUPPLY TANK

TY SPACE4 PCHOUT

START 5

REVISION HINE (15 FEBRUARY 1982)

4 .

9.7

CASE SPACE STATION HARDWARE (DEV)
DWRAP 30 95 130 50 120 30 30 15
REMOTE 0 0
ASUFPORT 1 .3 1 .3
BSUPPORT .3 .2 1 1 1
WEIGHT 0 0 5 2365
SCHEDULE 0 0
FINAL 1 0
FINAL 1 0
FILGHT 0 0
TOOLING 1
SPARES 10
SETS 1
CLASS 0
HILL 1

*** PCM MODEL REVISION NINE

128 00

18 FEB 1983 ***

	HILLIONS			*********	SUB/GFE
		DESIGN HOURS		DES & SHOP DOLLARS	DOLLARS
31	STRUCTURE				
147	TRUSS STRUCTURE 600 5			5.653	
.12	TRUSS SUPPORT 184.5	6387	3. 19163.	3.033	
.72	18055 SUFFURT 184.5 C	488	7. 1466.	0.433	
144	PIPING 100 5 0 0				
		199	2. 397.	0.176	
H3	LARGE TANK 776 5 0 0				
		1003	ó. 4817.	1.421	
#3	SMALL TANK 400 5 0 0				
		873		0.772	
194	RELIGUIFICATION & TRA				
		546	4. 1045.	0.465	
52	ELECTRONICS		dan 2 . M.		
r. +	FFECTE GHICE 2 2 0 0				
			4. 230.	0.063	
1371	INTEGRATION & TEST O				
		12	0. 36.	0.011	
END					
OFG					

*** FCM MODEL REVISION NINE

18 FEB 1983 ***

	********* MILLIONS *******	B.F.L.		MANUFACTUR DOLLARS	SUB/GFE TOTAL DOLLARS
51	STRUCTURE				
H7	TRUSS STRUCTURE 600 5 2 0 0				
		20416.	3062.	1.807	
M2	TRUSS SUPPORT 184 5 2 0 0				
		.3055.	456.	0.420	
19.4	PIFING 100 5 1.1 2 0 0				
11-	7.77.110 100 3 111 2 0 0	2032.	305.	0.279	
14.3	LARGE TANK 776 5 1.1 2 0 0		300.	****	
17.3	THAGE 1914 770 3 1.1 2 4 0	11377.	1736.	1.593	
43	SMALL TANK 400 5 1.1 2 0 0	*** **	4/40.		
10	3MMCE 1MMK 400 3 111 2 0 0	4395.	.34.	0.907	
	RELIGUIFICATION & TRANSFER M			. 4.70/	
14.4	VERTURALITY & LYMMERCK W			0.647	
		4705.		V.01/	
E	ELECTRUNICS				
2.1	ELECTRONICS 5 5 2 3 3				
		:061.		A * 7 4 2	
17:16	HARDWARE ASSEMBLY & CHECKOUT				
		13.	.:.	1,011	

```
H3 LARGE TANK 774 5 1.1 2 0 0
                                                                ORIGINAL PAGE 19
                                                    1.592
                                11577. 1736.
43 SHALL TANK 400 5 1.1 2 0 0
                                          789.
                                 4595.
                                                  0.907
M4 RELIGUIFICATION & TRANSFER HOD 306 5 2 0 0 4706.
                                          706.
                                                    0.647
F2 ELECTRONICS
E4 ELECTRONICS 5 5 2 0 0
                                 1061.
                                          157. 0.146
HAC HARDWARE ASSEMBLY & CHECKOUT 0 4 0 0
                                       16 FEB 1983 ***
         *** PCM MODEL REVISION NINE
*** BOEING ** PCM HOURS SUMMARY HOURS FCM ** FORING ****
 TITLE: SPACE STATION HARDWARE (DEV)
                           DEV SHOP 5.7.L.
101025 30307
1055
        BOEING HARDWARE SUBSYSTEM .HOURS
                                               5.7.L.
                                                            ā.C.
                            1055 316 1135
102080 30A07
B1 STRUCTURE
B2 ELECTRONICS
                                       30623 49518 7
        BOEING SUBTOTAL
                                                             7427
                            HARDWARE ASSEMBLY & C/G
                                                     8542
 SYSTEM ENGINEERING & INTEGRATION
                                17147
 SYSTEM ENGINEERING
SOFTWARE ENGINEERING
SYSTEMS GROUND TEST CONDUCT
SYSTEMS FLIGHT TEST CONDUCT
SUPPORT EQUIPMENT DESIGN
                                    4884
                                 17571
                                  2230
 SUPPORT EQUIPMENT MFG
                                    1877
 LIAISON ENGINEERING
                                 -- 5220
 DATA
PROGRAM MANAGEMENT (ENG)
PROGRAM MANAGEMENT (HFG)
                                    8666
                                   30130
              * BOEING PROGRAM HOURS (NOMINAL SCHEDULE)
               *** FCH MODEL REVISION NINE 18 FEB 1983 ***
CALLETTE STREET DOLLARS SUMMARY IN MILLIONS
                                              .................
TITLE: SPACE STATION HARDWARE (DEV)
                                           -- DEVELOPMENTAL --
                                          ENGR. HARDWARE
 HARDWARE SUBSYSTEM COST (SH)
                                                   4.432
                                          8.741
0.093
    SI STRUCTURE
82 ELECTRONICS
       SUBSYSTEM HARDWARE SUBTOTAL ($M)
                                            9.034
                                                      6.867
 GFE/SUPCON/GIVEN COST (+M)
                                                   . 0.0
                                            0.0
       SUBCON/GIVEN (S1-S50) SUBTOTAL (#M)
                                                       0.0
    HARDWARE ASSEMBLY & C/O
                                                       1.321
       HARDWARE SUBTOTAL (SM)
 SUPPORT COST (#M)
SYSTEM ENGINEERING & INTEGRATION
SOFTWARE ENGINEERING
                                            1.149
                                            0.396
    SYSTEMS GROUND TEST CONDUCT
SYSTEMS FLIGHT TEST CONDUCT
PECULIAK SUPPORT EQUIPMENT
                                             1.344
                                           0.0
    TOOLING & SPECIAL TEST EQUIPMENT
    SPARES
                                                       0.:81
    LIAISON ENGINEERING
                                            0.313
                                             0.520
    PROGRAM MANAGEMENT
                                                       0.374
      SUPPORT EFFORT SUBTOTAL (SM)
                                            3....
                                                      2.741
```

14.573

......

NO 10 . Pot 9 4 75 2

(CTAL (M) (NOMINAL SCHEDULE)

0

OF POOR QUALITY

	TYPE Science and Applications (Non-comm.) Commercial
COLTACT Page JOHN MALONEY Address CHERAL DYNAMICS CONVAIR DIVISION	(X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone	Importance of the Space Station to this Element 1 = Lov Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital Scale = 10
Desired First Flight, Year: 1992 Humber of Flights 1 Duration	of Flight, Days 180
DESCRIPTION A PROPELIANT STOPACE TECH DEMO MODULE WOULD CONSIST OF 2 TANKS NOUNTED ON A FRAME WHICE SPACE STATION. THIS NODULE WOULD INCLUDE CAUGING, INSULATION, SHIELDING, VENTING, PLUMA SEPARATE RELIQUIFICATION HODULE WOULD ATTACH TO THIS PROP STORAGE MODULE.	EN UOULD ATTACH TO THE BING, AND CONTROLS.
	RIGINAL
OREIT CMAPACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km. 500 Perigee, km 500 Tolerance + Inclination, dec. 28.5 Hodal Aggle, dec. ANY Ephemeris Accuracy, m Escape dv Required, m/s	POOR QUALITY
Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, des 28.5 Tolerance + -	POOR QUALITY
Apogee, km 500 Perigee, km 500 Tolerance + Tolerance + Tolerance + Tolerance + Tolerance + Tolerance + Ephemeris Accuracy, m Escape dv Required, m/s POINTING/ORIENTATION () Inertial () Solar () Earth (%) Any Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec	RIGINAL PAGE 19

() Realtime () Realtime () Encription/Decription R () Uplink Ecquired: C () On-Ecord Data Processin Description: Data Types: () Analo Film (Anount): Live TV (Lours/Day): On-Ecord Storage (Ebit) Data Dump Frequency (Pe Recording Rate (KBPS)	ormand Rate (KES): g Required g () Digital	Frequency (LHz): Hours/Day Voice (Hours/Day Other: Downlink command Downlink Frequen	rate:				OF POOR
Heat Rejection, W Op	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Haximum Haximum Haximum Haximum				•	QUALITY
EQUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	() Pressurized meters Width: meters Width:	Return mass, kg:	eight: eight:	mete	(Stoved) (Deploye		
Equipment ID/Function Length: Length: Launch mass, Consumable T	() Pressurized meters Width: meters Width: kg: ypes LH2 Sensitivity, (g) min	Return mass, kg:	eight: eight:				
Equipment ID/Function Length: Leugth: Launch mass, Consumable T Acceleration CELL REQUIREMENTS	() Pressurized meters Width: meters Width: kg: ypes LH2 Sensitivity, (g) min Task Assignments	Return mass, kg:	eight: eight: 				
Equipment ID/Function Length: Leugth: Launch mass, Consumable T Acceleration CREAL REQUIREMENTS Crew Size 3	() Pressurized meters Width: heters Width: kg: ypes LH2 Sensitivity, (g) min Task Assignments Skill 10	Return mass, kg:	eight: eight:				
Equipment ID/Function Length: Leugth: Launch mass, Consumable T Acceleration CRIM: REQUIREMENTS Crew Size 3	() Pressurized meters Width: neters Width: leg: Width: Sensitivity, (g) minus Task Assignments Skill 10	meters lineters linex:	eight: eight:				
Equipment ID/Function Length: Leugth: Launch mass, Consumable T Acceleration CREAL REQUIREMENTS Crew Size 3	() Pressurized meters Width: heters Width: kg: ypes LH2 Sensitivity, (g) min Task Assignments Skill 10	meters	eight:				

		Poei	ag-Specific I	nput Data				
HISCIGN TYPE Free Flyer {	(TIB Retrieve (Self-propell	OPS CODE F FT FII d) FST ed) FS						
Platform Based () Hot Serviced () Remote THS () Remote Hanned () Serviced at Station () Serviced at Station	(THS Retrieve (Self-propell	P PT PH PST ed) PS						
(X) Space Station Based Cortie		SS					•	
CONSTRUCTION/SERVICING COMP () Low () Medium () High	LEXITY .						OF POOR	Nicial
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use HVA Service EVA Service Experiment Ops Service Frequency	0 days 0 days 180 days 2 man- 4 man- 14 man- 2 time	/year days/year days/year days/year			. v		OR QUALITY	AL PAGE 18
Delta Valocities Up Down Aero Return								
Support Equipment Length: Length:	meters meters	Vidth:	meters meters	Height: Height:	meters	(Stoved) (Deployed)		
l'ass:	kg							
Hauifest Restrictions (X) To Restrictions () Only with compatible () Fly-Alone () Fust have Docking No	payloads dule							
Length of Pean Fab Humber of Appendages Humber of fourtes Required	to Assemble t	he Payload						

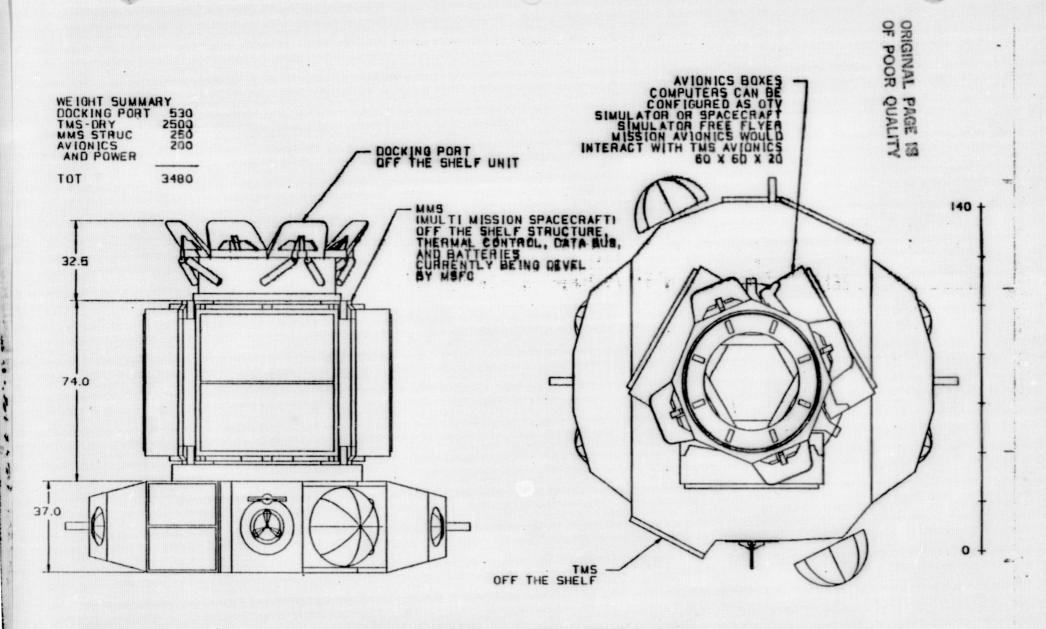
-2

PAYLOAD ELEMENT MALE MINE JOHN MALOHEY Address CONTACT	TYPE Science and Applications (flon-comm.) Commercial
Telephone STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
Desired First Flight, Year: 1993 Number of Flights 1 Duration	of Flight, Days 1
OBJECTIVE OTV SERVICIEG TECHNOLOGY DEMONSTRATIONS; OTV-TO-SPACE STATION RENDEZVOUS, DOCKING, AND BERTHING.	
TO THE SPACE STATION OR HANGAR. THIS THE UOULD DEMONSTRATE OTV STABILITY AND CONTROL, AUTOPILOT, COLPUTERS, ACS. UTILIZE THE OTV SIMULATOR FROM BACK2066 FOR RESTRING DEFO S.	F POOR
ORDIT CHAPACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Tolerance + - Inclination, deg 28.5 Hodal Angle, deg Any Escape dV Required, m/s	OUALITY
POINTING/ORIENTATION View birection () Inertial () Solar () Earth (K) Any Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	
Operating (X) DC (X) DC Duration, Ers/Day	
Operating Standly Continuous Pegg. Voltage, V Frequency, Hz	

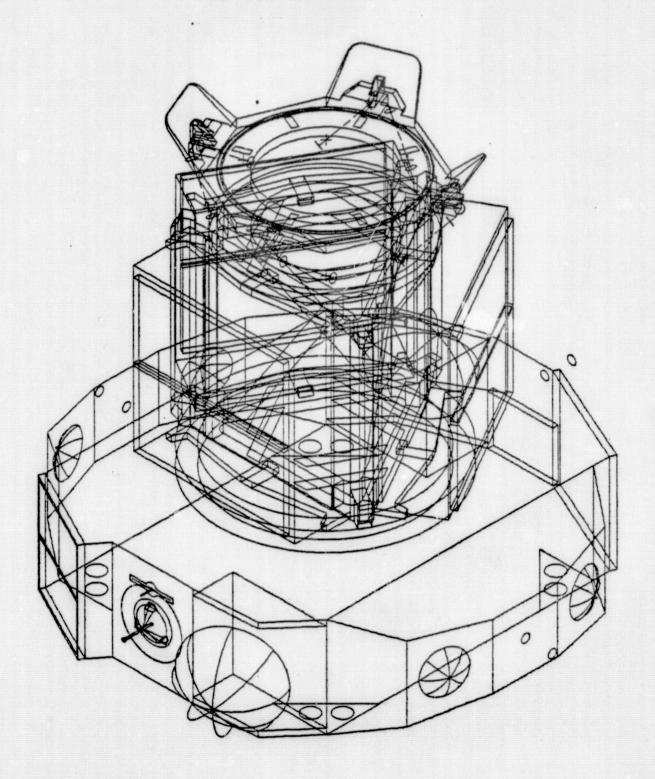
DATA/COLIMITICATIONS Ponitoring Requirements: Continue Carpent Carpent	equired outland Rate (KES): g Required 6 () Digital	her:	llou	quency (11 rs/Day ce (Hours er:				07	ORIGINAL	
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit)				mand rate: quency (Mz):				0.7	
THERMAL () Active (X) Passive Temperature, deg C Op No Neat Rejection, W Op	erational Minimum n-operational Minimum erational Minimum n-operational Minimum			Maximum Maximum Maximum Maximum					GE IS	
EQUIPMENT PRYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch wass, Consumable I	() Pressurized meters Width: meters Width:	Re	n	essurized	Height: Height:	mete mete		(Stoved) (Deploye		
CREW REQUIREMENTS Crew Size 2	Task Assignments 15	;								
Skills (See Table B)	Skill 15	11	I	1			ī	<u>i</u>	1	ī
	Level 3	1 3	ī	1	1 1	1	ī	1	1	Ţ
	Hours/Day 0.00	1 0.0	00 1	1	1 . 1	1	ı	ī	ı	
EVA (X) Yes () No	Reason			Hours/E	.VA					
SERVICING/MAINTENANCE Service:	Interval Returnables		days kg		rs required	kg				
Configuration Changes:	Interval Deliverables		days kg	Returna	rs Required bles	kg				

SPECIAL CONSIDERATIONS/See instructions

		I	oeing-Speci	ific In	out Data		
IOSIGH TYPE Free Flyer	(THS Retrieved)	OPS CODE F FT FI FST FST					
Platform Dased () Not Serviced () Remote TLS { } Remote Hanned { } Serviced at Station () Serviced at Station	(THS Retrieved)	P PT PM PST) PS					
Other (%) Space Station Based (%) Sortie		ss sor					•
CONSTRUCTION/SERVICING CON	PLEXITY						ORIG OF P
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	0 days 2 days 2 days/y 1 man-day 1 man-da 2 man-da 1 times/	ys/year ys/year					ORIGINAL PAGE IS
Delta Velocities [*] Up Down Aero Return							
Support Equipment Length: I Length: I	.00 meters	Width:	4.50 mete 4.50 mete		Height: Height:	2.00 meter 2.00 meter	
llass:	370 lig						
Hamifest Pestrictions (X) No Restrictions () Only with compatibl {} Fly-Alone {} Lust Lave Docking D	e payloads odule						
Leugth of Lean Fab Lunder of Appendages Hunder of 15dules Required	to Assemble the	Payload		3			



SPASTALO.TMS-MMS-DOCKPORT.FOLD SCALE FULL PICTURE SCALE I TO 24 UNIT IN



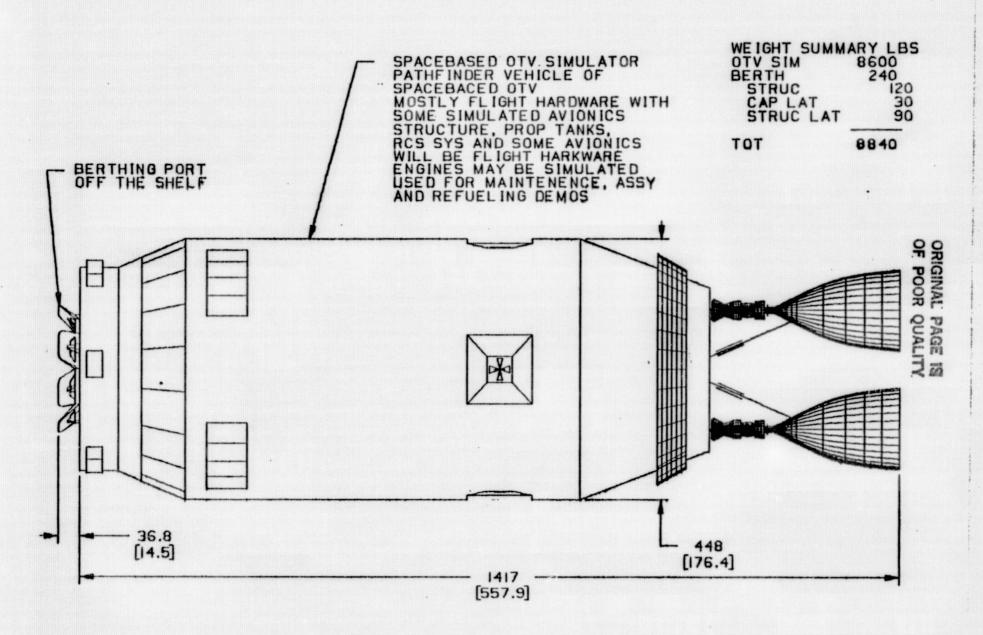
SPASTA.LO.TMS-MMS-DOCKPORT.FOLD DRAW 02 SCALE I TO 24 UNIT IN

PAYLOAD ELEMENT HAIM COTV-4) CODE CTV HAINT TECH DELO (CTV-4) BACK2066	TYPE Science and Applications (Non-comm.) Conmercial
CONTACT Name JOHN MALGHEY Address GENERAL PYNAMICS COUVAIR DIV	(x) Technology Development () Operations () Other () National Security () Type number (see table A) 15
Telephone	Importance of the Space Station to this Element 1 = Low Value, Eut Could Use
STATUS () Operational () Approved () Planued (%) Candidate () Opportunity	10 = Vital Scale = 10
	tion of Flight, Days 720
DESCRIPTION: USE AN OTV STRULATOR, MAINTENANCE HANGAR (SEE BACK2034), AND CANDIDATE HANDLING SYSTEMATIC OPERATIONS AND DEMONSTRATE PROPOSED HARDWARE.	STERS TO DEVELOP OTV
LATETELANCE OPERATIONS AND DENOISTRATE PROPOSED MARDIANES.	OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 23.5 Rodal Amile, deg ANY Ephemeris Accuracy, Escape dy Required, m/s	ORIGINAL PAGE IS OF POOR QUALITY
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Tolerance + Inclination, deg 20.5 Tolerance +	PAGE IS QUALITY
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + Inclination, deg 23.5 Hodal Angle, deg ANY Escape dv Required, m/s FORMTHIS/ORIENTATION () Inertial () Solar () Earth (X) And Truth Sites (if known): Pointing Accuracy, arc-sec Field of View (deg)	PAGE IS

Locitoring Requirements: Concord Control Realtine	Required () Digita	3):		her:		Frequentions/I	Day (Hour	rs/Da	y): d ra							OF POOR	
THERIAL () Active (X) Passive Topperature, dec C. Ope	erational Kinimu n-operational Ki erational Kinimu n-operational Ki	na inimi na inimi	una ura			lie lie		ura um um		<u> </u>						PAGE IS	
POUTPLUMET PHYSICAL CHAPACTERIST	rics					·											
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty Acceleration	(X) Pres 4.00 meters 4.00 meters ks: 35834 ypes LH2	U	idth: idth:		4.50 4.50 Retu	emote npressi meter meter n mass	rs rs s, k	ed g: max:	lleig lleig	ht: ht:	4:	50 50	neter neter	S	(Stoved) (Deploye	ed)	
Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty	(X) Pres	William Willia	idth: idth:		4.50 4.50 Retu	apressi	rs rs s, k	g:	lleig lleig	ht: ht:	4:	50 50	neter neter	s s	(Stoved) (Deploye	d)	
Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty Acceleration CREM REQUIREMENTS	(%) Pres 4.00 meters 4.00 meters kg: 35834 /pes LH2 Sensitivity, (g	u U	idth:	min:	() U 4.50 4.50 Retu	meter meter meter meter	rs rs s, ka	g:	lleig	ht:					(Stoved) (Deploye	ed)	
Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty Acceleration CREM REQUIREMENTS Crew Size	(X) Pres 4.00 meters 4.00 meters kg: 35834 ypes LH2 Sensitivity, (g	William Willia	idth: idth:	min:	4.50 4.50 Retu	meter meter meter meter mass	rs rs s, kg	g: ax: 10	lleig	ht:	12		13		(Stoved) (Deploye	l 1	<u></u>
Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty Acceleration CREM REQUIREMENTS Crew Size	(%) Pres 4.00 meters 4.00 meters kg: 35834 ypes LH2 Sensitivity, (g Task Assigna	William Willia	idth: idth:	min:	() U 4.50 4.50 Retu	meter meter meter meter mass	rs rs s, kg	E: max: 10 3		ht:	12	 !	13		(Stoved) (Deploye	1	
Equipment ID/Function Length: 14 Length: 14 Launch mass, Consumable Ty Acceleration CREM REQUIREMENTS Crew Size	(%) Pres 4.00 meters 4.00 meters kg: 35834 ypes LH2 Sensitivity, (g Task Assigna Skill Level	wij	idth: idth: 5 7 3 0.00	min:	() U 4.50 4.50 Retu 8 1 3 1	meter meter meter meter mass	rs rs s, kg	10 3 0.00		ht:	12	 !	13		(Stoved) (Deploye	l 1	

THE ROBOTIC HAMIPULATOR WOULD BE PROVIDED BY BACK2059 TDH.

```
Boeing-Specific Input Data
                                                          OPS CODE
HISGIGH TYPE
    Free Flyer
                                                              F
                                                              FII
        Renote TriS
Periote Tamied
                                                              FST
         Serviced at Station (THE Retrieved)
     ) Serviced at Station (Self-propelled)
                                                              FS
    Platform Based
                                                              P
      ) Not Serviced
                                                              PT
      ) Remote TES
                                                              PII
PST
      Renote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                               PS
    Ctler
Space Station Based
Sortie
                                                               SOR
CONSTRUCTION/SERVICING COMPLEXITY
    ( ) High
Operations Times
OTV Up/Down
                                            0 days
                                           0 days
10 days/year
2 man-days/year
20 man-days/year
    OTV or THE on Orbit
    Pission Use
IVA Service
EVA Service
                                           10 man-days/year
4 times/year
    Emperiment Ops
    Service Frequency
Delta Velocities
    Up
Down
Aero Return
Support Equipment
                                                                                                                                      (Stoved)
(Deployed)
                                                                                                                       meters
                                                                               meters
                                         meters
                 Length:
Length:
                                                                                                                       meters
                                                                               meters
                                         neters
                               2000
                 Hass:
Panifest Lestrictions
     (%) No Destrictions
         Only with compatible payloads
     { } Ply-Alone | Docking Module
 Length of Pean Fab
 Humber of Appendages
Lumber of iodules Required to Assemble the Payload
```



SPASTA.LO.OTV-BERTHPORT DRAW OI UNITS: PRIM CM, SECND IN

PAYLOAD ELEMENT MALE PAYLOAD/OTV THTEG TECH DEMO (OTV EACK2067	Science and Applications (Non-comm.)
COLTACT Lane Lane Address COLVATE DIV	(X) Technology Development () Operations () Other () Mational Security Type number (see table A) 15
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital Scale = 10
Desired First Flight, Year: 1994 Humber of Flights 1 Duratio	n of Flight, Days 30
OEJECTIVE OTV SERVICING TECHNOLOGY DEMONSTRATIONS: PAYLOAD-TO-OTV HANDLING; IZTING; CHECKOUT; REMOVE/REPLACE COMPONENTS; DEMATE.	
DESCRIPTION USE A PAYLOAD SHRULATOR MODULE IN COMJUNCTION WITH THE OTV SIMULATOR AND HANDLING EQU TO COMBUCT DEMONSTRATIONS OF CAPABILITIES LISTED IN OBJECTIVE.	OF POOR
ORBIT CMALACTERISTICS. Coosynchronous Orbit () Yes (X) No Apogee, km 500 Tolerance + Inclination, deg 28.5 Hodal Aggle, deg ANY Escape dv Required, m/s	PAGE 18
POHITTHE/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	
POLITY () AC (X) DC Power, W Duration, Krs/Day	
Operating Standby () Continuous Peak Voltage, V Frequency, Mg	

Vocitoring Requirements: (A) Realtime (Bone) (A) Realtime (Bone) (A) Realtime (Bone) (A) Recuired: (Bone) (A) Required: (Bone) (Bone) (A) Recuired: (Bone)	mand Rate (KBS Required () Digita	():	Oth	er:	Ho Vo Ot Do	requenc ours/Da oice (No her: ownlink	ours/D	ay): nd rat							OF POOR	
Heat Rejection, V Open	rational Kinimu -operational Mi rational Kinimu -operational Ki	nimum				llax llax	i auta i auta i auta i auta							•	PAGE IS	
COUPPERT PHYSICAL CHARACTERISTI Location () Internal Equipment ID/Function Length: Length: Launch mass, k Consumable Typ Acceleration S	() Pres meters meters (E:	Surize Wid Wid	th: th:	(X)	Unp	note ressur meters meters mass,		Heigh Heigh	t: t:			meter meter		(Stowed) (Deployed)	
Equipment ID/Function Length: Length: Launch mass, k Consumable Typ	() Pres meters meters (E:	Wid Wid	th: th:	(X)	Unp	ressur meters meters	kg:	Heigh Heigh	t: t:						· ·	
Equipment ID/Function Length: Length: Launch mass, k Consumable Typ Acceleration S	() Pres meters meters (g: Jes Gensitivity, (g	Wid Wid	th: th:	(X) Retuin:	Unp urn	ressur meters meters	kg: max:	Heigh	t: 	12		meter			· ·	 <u>-</u>
Equipment ID/Function Length: Length: Launch mass, k Consumable Typ Acceleration S Crey Size	() Presmeters meters (g: General Task Assignm	Wid Wid	th: th:	(X) Retuin:	Unp urn	ressur meters meters mass,	kg: max:	Heigh	t: 	12 7		meter			1	
Equipment ID/Function Length: Length: Launch mass, k Consumable Typ Acceleration S CREE REQUIREMENTS Cree Size	() Presmeters meters g: Gensitivity, (g Task Assignm Skill Level	Wide Wide Wide Wide Wide Wide Wide Wide	th: th:	(x) Retuin: 8 3	Unp urn	neters meters meters mass,	max:	Heigh	t: <u>-</u> i'	3	 1	13 3	 		· ·	
Equipment ID/Function Length: Length: Launch mass, k Consumable Typ Acceleration S Crev Size	() Presmeters meters g: g: Consistivity, (g Task Assigns	Surize Wide Wide	th: th:	(x) Retuin: 8 3	Unp urn	yeesur meters meters mass,	max:	11 3 0.	t: <u>-</u> i'	3	 1	13 3) 	

THIS TEN WOULD UTILIZE HARDWARE FROM BACK2066.

	D	oeing-Specifi	ic Input Data			
I.ISSION TYPE Free Flyer () Not Serviced () Not Serviced () Note TIS () Note Flammed () Serviced at Station (TES Retrieved) () Serviced at Station (Self-propelled	OPS CODE F FT FE FE FST					
Platform Based () Not Serviced () Remote THS () Remote Hammed () Serviced at Station (THS Retrieved) () Serviced at Station (Self-propelled	P PT PH PST PS					
Other (*) Space Station Based (*) Sortie	SS SOR					
CONSTRUCTION/SERVICING COMPLEXITY Construction Low Hedium High Complexity Complexit						ORIGII OF PC
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use TVA Service EVA Service CVA S	ys/year ys/year			, ,		ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return						
Support Equipment Length: 2:00 meters Length: 2:00 meters	Width:	4.50 Leters	s lleight: s lleight:	2.50 meters	(Stoved) (Deployed)	
Hass: 500 kg						
Hanifest Restrictions (X) No Pestrictions () Only with competible payloads () Fly-Alona Bocking Module						
Length of Lem. Fab Hunder of intendences Hunder of intendence Required to Assemble the	Payload					

1 1 1 100 100 100 1

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PAYLOAD/OTV INTEGRATION

EVA Select lighting

Secure tools

Inspect OTV

Determine ready to mate to SS

Activate Rms

Attach Rms to SAT

Release SAT hold down clamps

Maneuver SAT to OTV mating interface

Align SAT and OTV

Activate OTV pull-down and Hold mech

Confirm P/L OTV mate

Release Rms from SAT

Retract Rms

Activate SAT systems

Deploy SAT antennas and appendages

Monitor test progress

Checkout electronics

Identify faulty mechanical or electrical components

Remove defective unit

Stow defective unit

Obtain spare from stowage

Replace unit

Confirm SAT operational

Inspect SAT, determine ready to demate

Activate Rms

Attach Rms to SAT

Release OTV SAT hold down clamps

Guide SAT from OTV with Rms

Maneuver SAT to storage area

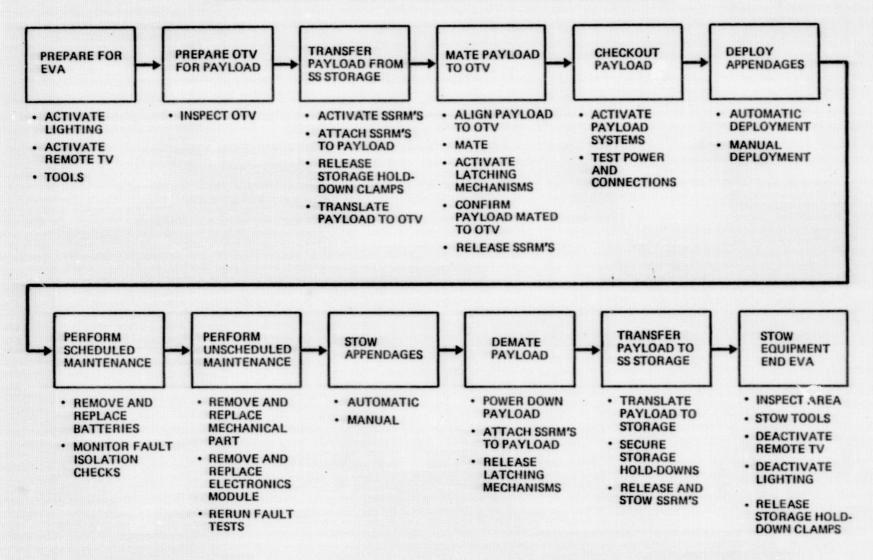
Position SAT on hold downs

Secure SAT

Release Rms

Stow Rms Stow tools Deactivate lights End EVA

FUNCTIONAL FLOW PAYLOAD OTV INTEGRATION TECHNICAL DEMONSTRATION



PAYLOAD CLEMENT HAME CLOSED ECLS FOR SPACE STATION CONTACT Hame HARLAN F. BROSE Address LAMILTON STANDARD, BRADLEY FIELD RD WINDSOR LOCKS, CT 06096	TYPE Science and Applications (Non-comm.) Commercial X Technology Development Operations Other Ilational Security Type number (see table A) 15
Telephone 203/623-1621 CTATUS () Operational () Approved (X) Planned () Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
	uration of Flight, Days 130
DESCRIPTION THE LATER FROM CREW HYGIENE USES, CLOTHING AND DISHMASHING, AND FROM CREW URINE,	PECDIPATION AND DEDCRIBA-
	, RESPIRATION AND PERSPIRA-
CALLOR DIGGIDE EDGE HE COCCEDIESTED ADD FEDUCIO TO ORTAIN OFFCED FOR COEU REPADA	
CARBOR DICKIDE RUST BE CONCENTRATED AND REDUCED TO OBTAIN OXYCEN FOR CREW METABOR ELIMINATE ANOTHER LARGE RESUPPLY PERALTY.	CLIC HEEDS IN ORDER TO
CALLOR DIGGIDE EDGE HE COCCEDIESTED ADD FEDUCIO TO ORTAIN OFFCED FOR COEU REPADA	LARGE RESUPPLY PENALTY. OLIC HEEDS IN ORDER TO OF POOR PAGE - AGE
CREAT CHAPACTERISTICS. Coosynchronous Orbit () Yes (X) No Apolee, la. 500 Perigee, la. 500 Tolerance + Inclination, deg 28.5 Escape dy Required, m/s POINTING/ORIERTATION	CY, M
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apolee, la. 500 Perigee, la. 500 Tolerance + Inclination, deg 28.5 Lodal Angle, deg Escape dy Required, m/s POINTING/ORIENTATION View Direction View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec	CY, M

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Content Requirements: Content Realtine Content Required: Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Content Conte	uired Hand Rate (KES Required	:):	ther:	Frequer	ay					
Live TV (Cours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Recording Rate (KBPS)	0rbit) 1 15.00			Down1 in		nd rate: ency (131z)):			99
Heat Rejection, W Oper	ational Minim operational Minim ational Minim operational M	n Laura Ka	2 300 100	112	zimum zimum zimum zimum zimum	35 1000 150				RIGINAL P
LOUIPLEAT PHYSICAL CHARACTERISTIC (X) Internal Equipment ID/Function Length: 3.0	CS (X) Exto (X) Pres	surized	(Remote Unpressi	9	Height:	1.00	meters	(Stowed) (Deployed)	ALITA SE IS
Length: 3. Length: 3. Launch mass, k Consumable Type Acceleration S	g: 350 es CHETICALS, ensitivity, (g	FILTER	Re S, SPAR min:	00 meter turn mass, ES	kg:		1.00		(beproyea)	
Length: 3. Launch mass, k Consumable Typ Acceleration S CREW REQUIREMENTS Crew Size 2	g: assign		min:						(Deproyed)	
CREW REQUIREMENTS	ensitivity, (g		min:						(Deproyed)	
GREW REQUIREMENTS Grew Size 2	Task Assigm		AINTAIN				1.00	<u> </u>		
GREW REQUIREMENTS Grew Size 2	Task Assigm	5 1	AINTAIN 1 9 1 2							
CREW REQUIREMENTS Crew Size 2	Task Assigm	1 1.00	AINTAIN 1 9 1 2	1 1 0 1			1.00			1 1 1 1

THE CALL BY THEIR PRESENCE PROVIDES THE INPUT TO THE EXPERIGENT.

- - - PRICE 64 - -ELECTRONIC ITEM

DATE 4-MAR-83

TIME 10:49 (283010)

FILENAME: REID. DAT

CLOSED ECTLS FOR SPACE STATION

11	UNIT	WEIGHT 1870.00	MODE	1
PROTETYPE QUANTITY	2.000 UNIT	VOLUME 215.60	QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST	
ENGINEERING				
DRAFTING	5021.		5021.	
DESIGN	20097.	-	20097.	
SYSTEMS	8754.		8754.	
PROJECT MGMT	11681.		11681.	
DATA	1597.		1597.	
SUBTOTAL (ENG)	47149.		47149.	
MANUFACTURING				
PRODUCTION				
PROTOTYPE	11074.		11074.	
TOOL-TEST EQ	9495.		9495.	
SUBTOTAL (MFG)	20549.	-	20569.	
TOTAL COST	67718.		67718.	

Function:

SOLIT ACTAY ADDITION TECH DENG (BACK2069	TYPE Science and farliantians (P.
COLTACT Lenae HETVII LILLER Address BOEIRG AEROSPACE	Science and Applications (Non-count.) Connercial Technology Development Operations Other Ilational Security Type number (see table A) 11
Telephone 206/773-8150	Importance of the Space Station to
() Operational () Approved () Planned (X) Candidate () Op	ortunity Scale = 10
Desired First Flight, Year: 1992 Emaber of Flights 1 OFJECTIVE SATELLITE SERVICING TECHNOLOGY DEMONSTRATION: DEMONSTRATE CAPABILITY TO ADD ADDITIONAL SOLAR ACRAY TO SPACE STATION BY STRUCTURE AND ADDITIONAL SOLAR ACRAY AND ADDITIONAL SOLAR	Duration of Flight, Days 2
TO ADD ADDITIONAL SOLAR ARRAY TO SPACE STATION BY STRUCTURAL AND ELECTRICAL MODIFICATIONS.	
DUPTIC A THE TH CRACE CRACKET OF LOCATOR LOCATOR	OLAR ARRAYS AND THEN HOVE IT TO A TION TESTS AND REDEPLOY AND REACTIVATE
DESCRIPTION DURING A LULL IN SPACE STATION MISSION ACTIVITY UNEN IT IS FEASIBLE TO OTHER OTHER SOLAR ARRAY WING IS DECESSARY TO PROVIDE THIS STATION'S POWER DEMOLICATE CAPABILITY TO RETRACT SOLAR ARRAY, DISCONNECT ONE OF THE STOPPICE LOCATION. BRING IT BACK AND RETRISTALL. PERFORM NECESSARY FUNCTIONS OF THE SOLAR ARRAY.	OLAR ARRAYS AND THEN HOVE IT TO A TION TESTS AND REDEPLOY AND REACTIVATE
DUPTIC A LULL IN SPACE STATION HISSION ACTIVITY UNEN IT IS FEASIBLE TO OHLY GHE SOLAR ARRAY WING IS NECESSARY TO PROVIDE THIS STATION'S POWER DEMONSTRATE CAPABILITY TO RETRACT SOLAR ARRAY, DISCONNECT ONE OF THE STOPLE LOCATION. BRING IT BACK AND REINSTALL. PERFORM NECESSARY FUNCTIONS OF THE SOLAR ARRAY. CHAIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apage, la. 500 Perigee, la. 500 Toleran Inclination, deg 28.5	OLAR ARRAYS AND THEN HOVE IT TO A THOM TESTS AND REDEPLOY AND REACTIVATE OR OR OR OR OR OR OR OR OR O
DURTIC A LULL IN SPACE STATION HISSION ACTIVITY UNEN IT IS FEASIBLE TO OHLY ONE SOLAR APRAY WING IS DECESSARY TO PROVIDE THIS STATION'S POWER DEMONSTRATE, CAPABILITY TO PETRACT SOLAR ARRAY, DISCONNECT ONE OF THE STOPLOG LOCATION. BRING IT BACK AND REINSTALL. PERFORM NECESSARY FUNCTION OF THE SOLAR APRAY. CEOSYNCHRONOUS Orbit () Yes (X) No Apole, km 500 Perigee, km 500 Toleran Inclination, deg 20.5 Toleran Escape of Required, m/s POLITIC/ORIENTATION () Inertial () Solar () Ear Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	Ce + - QUAL Ce + - QUAL Ce + - QUAL Cis Accuracy, M
DUPTIC A LULL IN SPACE STATION HISSION ACTIVITY UNEN IT IS FEASIBLE TO OHLY ONE SOLAR APRAY WING IS DECESSARY TO PROVIDE THIS STATION'S POWER BENCH STATE CAPABILITY TO PETRACT SOLAR APRAY, DISCONNECT ONE OF THE STOPLOGE LOCATION. BRING IT BACK AND REINSTALL. PERFORM NECESSARY FUNCTION OF THE SOLAR APRAY. CHAIT GUARACTERISTICS Geosynchronous Orbit Aprope, land 500 Perigee, land 500 Tolerand Inclination, deg 26.5 Endel Angle, deg 26.5 Endel Angle, deg 26.5 Escape CV Required, m/s POINTING/GRIGHTATION View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (litter) Pointing Stability (litter)	Ce + - QUAL Ce + - QUAL Cis Accuracy, is Cit (E) Any

Acceleration CREW REQUIREMENTS Crew Size Skills (See Table B) EVA (X) Yes () No	Task Assign Skill Level Hours/Day Peason PAI	l l	11 3 0.00	1	12 3 0.00	I	3 0.00	l	/pp.4	1 1 1 .	 1	· I			
CREW REQUIREMENTS Crew Size	Task Assign Skill Level	ыen 	11 3	Ī	12	I	3			I		· · · · · · · · · · · · · · · · · · ·			
CREW REQUIREMENTS Crew Size	Tesk Assign	мen	ts 11	<u></u>	12	 - <u>!</u>		 - <u>!</u>		!	<u></u>	 	 !	<u>!</u>	 - <u>!</u>
CREW RECUTREMENTS			ts									 . _:			
Acceleration	sensitivity, (5,		-											
EQUIPERIT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function Length: Length: Launch mass Consumable T	() Pre meters meters kg: ypes	ssu	rized Width: Width:		Ret		mete	rs , kg:		Height: Height:			ers	(Stowed) (Deployed)	7 16
Heat Rejection, W Ope	erational Minim n-operational M erational Minim n-operational M	ini	iaura iaum				1	aximu azimu aximu aximu	im im					·	NAL PAGE IS
Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit) Data Dump Frequency (Per Recording Rate (KEPS)	: r Orbit)					Do	her: mli	nk co	mman	d rate:	z):				OF POOR
Description: Data Types: () Analog	() Digit					llo Vo	urs/	Day (Hour	s/Da	v):					
Contoring Requirements: () Realtime () Encription/Decription Re () Uplink Required: () On-Coard Data Processing	namand Rate (KE	s):				Fr	eque	ncy (131z)						

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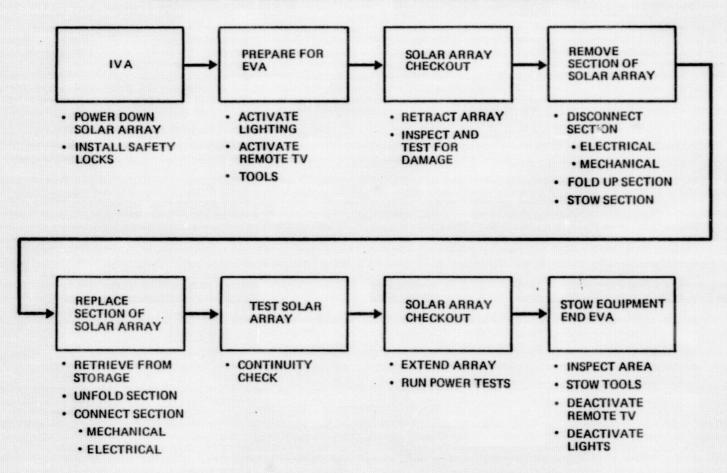
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Doeing-Specific Input Data
 INSCION TYPE
Free Flyer
                                                                   OPS CODE
      ( ) Not Serviced
( ) Perote TIS
( ) Renote Tis
( ) Renote Fanned
( ) Serviced at Station (TMS Retrieved)
( ) Serviced at Station (Self-propelled)
                                                                        F
                                                                        FI
                                                                        FST
                                                                        FS
      Platform Lased
        ) Not Cerviced
           Renote TIS
                                                                        PT
           Remote Hanned
Remote Hanned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
     Other
Space Station Based
Sortie
                                                                       SOR
                                                                                                                                                                              OF POOR QUALITY
CONSTRUCTION/SERVICING COMPLEXITY
     ( ) High
Or Up/Down
                                                   0 days
     OTV or THE on Orbit
                                                  0 days
1 days/year
1 man-days/year
     Lission Use
IVA Service
EVA Service
                                                   1 man-days/year
     Experiment Ops
                                                   1 man-days/year
     Service Frequency
                                                  1 times/year
Delta Velocities
    Up
Down
Acro Return
Support Equipment
                                              meters
                                                                                        Leters
                                                                                                                                                      (Stoved)
(Deployed)
                                                                                                                                      meters
                                              meters
                                                                                        meters
                                                                                                                                      meters
                   llass:
                                            kg
Manifest Restrictions
        ) No Restrictions
       Only with compatible payloads
Fly-Alone
Last have Docking Module
Longth of Rec. Pab
Humber of Appendages Required to Assemble the Payload
```

SOLAR ARRAY ADDITION 2069

IVA Power down solar array Install locks

EVA Get tools Select lighting Retract one solar array Inspect for damage Disconnect one section Attach RMS Remove one section Move solar array to storage area Position solar array Secure solar array Disconnect Rms Stow Rms Reactivate Rms Move to solar array Attach RMS to solar array Release solar array from hold downs Transport solar array section to solar array boom Position solar array section on boom Secure station to boom Release RMS Stow Rms Cable up section Verify operation of solar array Extend solar array Stow tools Deactivate lighting End EVA Unlock power panel Activate solar array

FUNCTIONAL FLOW SOLAR ARRAY ADDITION TECHNICAL DEMONSTRATION



PAYLOAD ELEMENT HALE FORLATION FLYTHG TECH DEBO (SS-2 BACK2070		TYPE Science and Applications (Hon-c Commercial	OLAL.)
CONTACT Vance METTH HILLER Address COCING AEROSPACE CO		(X) Technology Development () Operations () Other () National Security Type number (see table A) 15	
Telephone 206/773-8150		Importance of the Space Station to this Element 1 = Low Value, But Could Use	
() Operational () Approved () Planned (X) Candidate	() Opportunity	10 = Vital Scale = 10	
Desired First Flight, Year: 1994 Humber of Flights		of Flight, Days 30	
COJECTIVE SERVICING TECHNOLOGY DEMONSTRATION: DEMONSTRATE CAP FOR SPACE STATION TO DIRECT AND COORDINATE FORMATION FLYING NOF CO-CREITING SPACECRAFT.	PABILITY MANEUVERS		
DESCRIPTION USE A TIC AS A FREE-FLYER SIMULATOR. CONFIGURE THE COMMUNICAT FREE-FLYER SATELLITE'S CHARACTERISTICS. LAUNCH THE THE FROM T FULTHER DISTANT STATION-KEEPING LOCATIONS. USE THE SPACE STAT CONTROL THE THE STATION-KEEPING NAMEUVERS.	THE SPACE STATION AND FLY I	T TO SUCCESIVELY	
OLLIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, la. 500 Perigee, kn 500 Inclination, deg 28.5 Hodal Angle, deg ANY Escape dv Required, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, m	ALITY	à
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	() Earth (X) Any Field of View (deg)		
POWER, U Duration, Hrs/Day			
Operating Standby Policy, V Frequency, Uz	() Continuous		

D.TA/CCIL BATCATIONS Vocitoring Requirements: Above (2) Realtime (2) Exerciption Required: Encription/Decription Required: Uplink Required: Commonwealth Commonwealt	Required) Othe	er:		quency	(:IIz):						
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Loard Storage (Hbit):	() Digital			Voi	rs/Day .ce (Hou .er:	rs/Day)):					
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit)				mlink c mlink F		rate: y (llz):				0	0
THERMAL () Active () Passive Temperature, deg C Operation, U Operation, U Operation, U	ational Hinimum operational Hinim ational Hinimum operational Hinim	na na			Haxin Haxin Haxin Haxin	una					OF POOR QU	IIGINAL PA
Length: Launch mass, k Consumable Typ	00 meters United Section 1988	idth: idth:	(X) 4. Ret	100 m	essuriz eters eters ass, kg	ll c	eight: eight:	4.00 met 4.00 met	ers ers	(Stoved) (Deployed)	ALITY	PAGE IN
CREW REQUIREMENTS Crew Size	Task Assignment	5										
Skills (See Table B)	Shill	7	8	1	1	I	ľ	ı	ı	ı	ı	Ī
	Level	3	3	1	3 1	- 1	- 1	ı	1	1	1	- 1
	Hours/Day	0.00	0.00	1 0	.00	I	. 1	ı	ı	I	1	
EVA () Yes () No	Reason PREPARE				llours							
SELVICIUS/IMINTEHANCE	Interval Returnables			days kg	Han h	mables nours re	equired	ks				
Configuration Changes:	Interval Deliverables			days	Han-E Retur	lours Pa	equired	kg				

	ľ	oeiag-Specific In	nput Data			
HISSION TYPE Free Flyer () Not Serviced () No. Serviced () Remote This () Remote Hanned () Serviced at Station (THS Retrieved) () Serviced at Station (Self-propelled)	OPC CODE F FT FI FST FS					
Platform Based () Lot Serviced () Remote TMS () Remote Henned () Serviced at Station (TMS Retrieved) () Serviced at Station (Self-propelled)	P PT PH PST PS					
Space Station Based	SS SOR					•
CONSTRUCTION/SERVICING COMPLEXITY Low Hedima High						ORI
Operations Times OTV Up/Down OTV or THS on Orbit Lission Use IVA Service EVA Service Experiment Ops Service Frequency Odays Od	s/year s/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return						く間
Support Equipment Longth: 1.00 meters Length: 1.00 meters	Width:	4.50 meters 4.50 meters	Height: Height:	2.50 meters 2.50 meters	(Stoved) (Deployed)	
Hass: 370 kg						
Califest Restrictions () No Restrictions () Caly with compatible payloads { } Ply-Alone Fly-Alone Fly-Alone						
Length of leas Fab Humber of Appendages Humber of locales Lequired to Assemble the I	Payload					

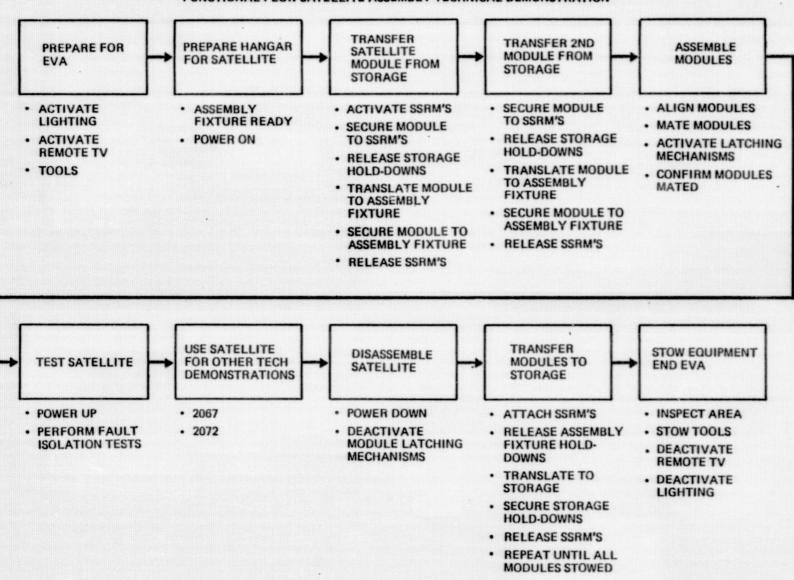
CODE SATELLITE ASSY TECH DERO (SS-3) BACK2071 CONTACT HAME KETTH MILLER Address BCDING AEROSPACE 2067773-6150	TYPE Science and Applications (Non-comm.) Commercial
Telephone STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
Desired First Flight, Year: 1994 Number of Flights 1 Dura	tion of Flight, Days 1095
CUJECTIVE SERVICING TECHNOLOGY DEMONSTRATION: DEMONSTRATE CAPABILITIES TO ASSEMBLE SPACECRAFT FROM HODULES DEPLOY APPENDAGES, TEST AND CHECKOUT SATELLITE, AND PERFORM DISASSEMBLY OF S/C FOR RETURN TO GROUND.	
	99
DESCRIPTION CONFICURE A SPACE STATION SATELLITE ASSEMBLY TECH DEMO SPACECRAFT FROM SPACE PARTS SATELLITE PRODUCTION PROGRAMS. THE TECH DEMO SPACECRAFT SHOULD BE MODULAR, MAYE ST APPENDACES, AND MAYE ACTIVE AVIOLICS, AND WOULD MAYE A MATERIALS PROCESSING MODULA	FROM ONE OR MORE EVERAL DEPLOYABLE ESTIMATOR, A
APPENDACES, AND HAVE ACTIVE AVIORICS, AND WOULD HAVE A LATERIALS PROCESSING HOULI VARIETY OF APPENDACE DEPLOYMENT CONCEPTS (AUTOMATIC, NAMUAL, ETC.) COULD BE TRIED BE LELIVERED TO THE SPACE STATION WHERE IT WOULD THEN DE ASSEMBLED, TESTED, DISASS GROUND. THIS TEST ARTICLE WILL ALSO BE USED IN THE SS-5 TECH DENO.	OUT. THIS HARDWARE WOULD SEIBLED AND RETURNED TO THE CAR
OFFIT CHARACTERISTICS Coosynchronous Orbit Apolog, har 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Ended Angle, deg Any Ended Angle, deg Ended Anyle, deg and anyle deg and anyle deg and anyle deg anyle d	ALITY GE 188
ORDIT CHARACTERISTICS Coosynchronous Orbit () Yes (X) No Apolee, ha 500 Perigee, ka 500 Tolerance + Inclination, deg 28.5 Tolerance +	ALTY ME
ORDIT CHARACTERISTICS Coosynchronous Orbit () Yes (X) No Apolee, ha 500 Perigee, ha 500 Tolerance + Inclination, deg 28.5 Endel Angle, deg Any Escape dv Required, m/s POINTING/CRIENTATION View Divection Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec	ALTY ME

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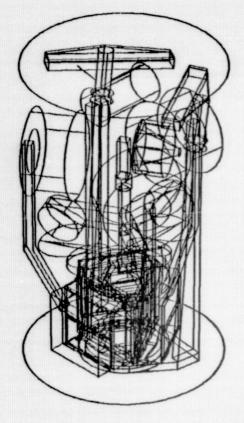
LATA/COLI ULICATIONS Louitoring Requirements inc	() Offline () 00	ther:										
() Encription/Decription Req () Uplink Required: Con- On-Fourd Data Processing	uired mand Rate (KES): Required		Frequ	ency (191z):						0.0	
Data Types: () Analog Film (Amount): Live TV (Lours/Day): On-Board Storage (Ubit): Data Dump Frequency (Per	() Digital		Other Down1	(Hours/Da	nd rate:						OF POOR	
Recording Rate (KBPS)			Dotml	ink Frequ	ency (1112	:):					02	
THERMAL () Active () Passive											PER	
Temperature, des C Oper	rational Kiniama			Haximum							司爾	
Heat Rejection, W Oper Hon-	operational Minimum ational Minimum operational Minimum			Maximum Maximum Maximum							•	
Launch mass, k Consumable Typ	50 meters Width Width Width Se: 2640 Sensitivity, (g)	Reti	50 Let 00 Let 1rn Las	ers s, kg: 26	Height: 40		1.50	meter	rs 	(Deploye	d) 	
Skills (See Table B)	Skill 7	1 8	1 0	1 10	11	7 7	2	I 13				
outile (see lable b)	Level 3		1 3	1 3	1 3	<u></u>	3	1 3	 	-	 	i
	Hours/Day 0.00	1 0.00	1 0.0	0.00	1 0.00	1 (.00	1 0.00)	<u>-</u>	1	<u>-</u>
EVA (X) Yes () No	Reason ASSEEDLY DE	110		Hours/EVA								
SERVICIES/MAINTENANCE	Interval Returnables			Consumabl				kg				
Configuration Changes:	Interval Deliverables		lays	lian-llours Returnabl	Required	1						

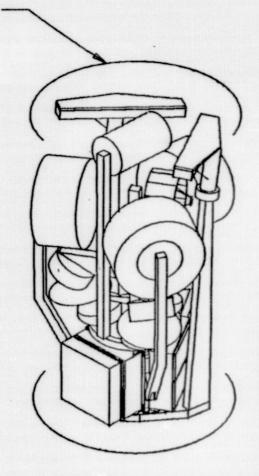
THIS TEST ARTICLE WILL ALSO BE USED IN THE SS-5 TESM DELO MISSION (BACK2073).

FUNCTIONAL FLOW SATELLITE ASSEMBLY TECHNICAL DEMONSTRATION

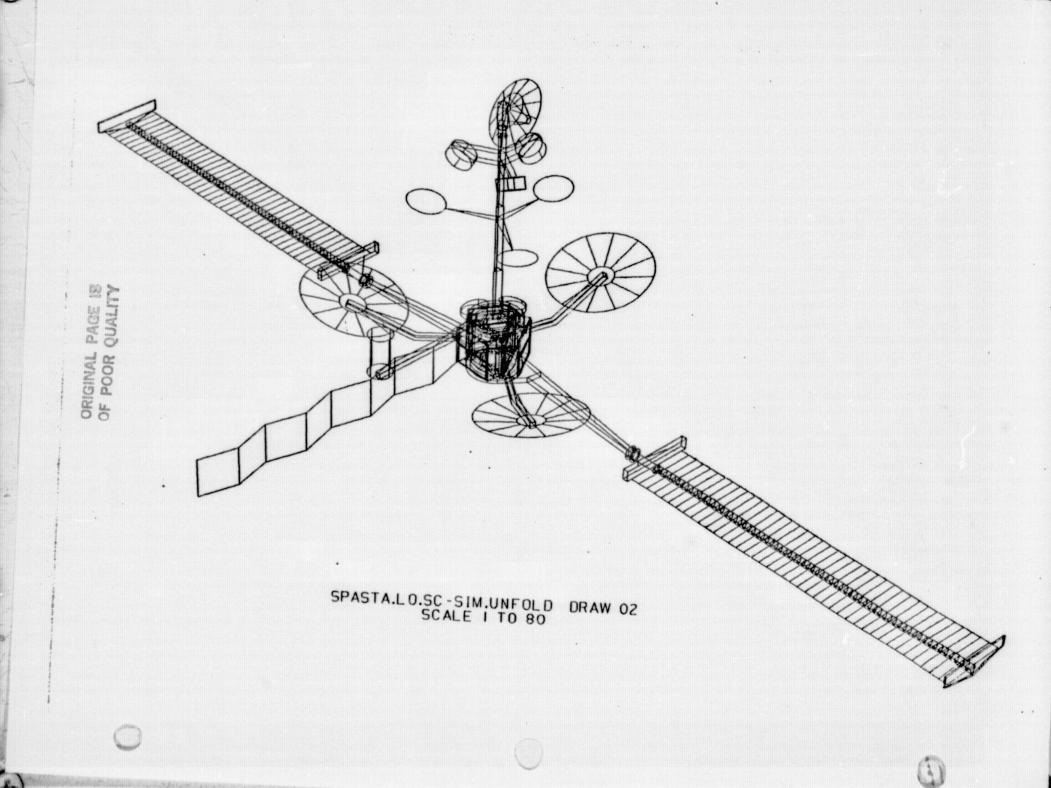


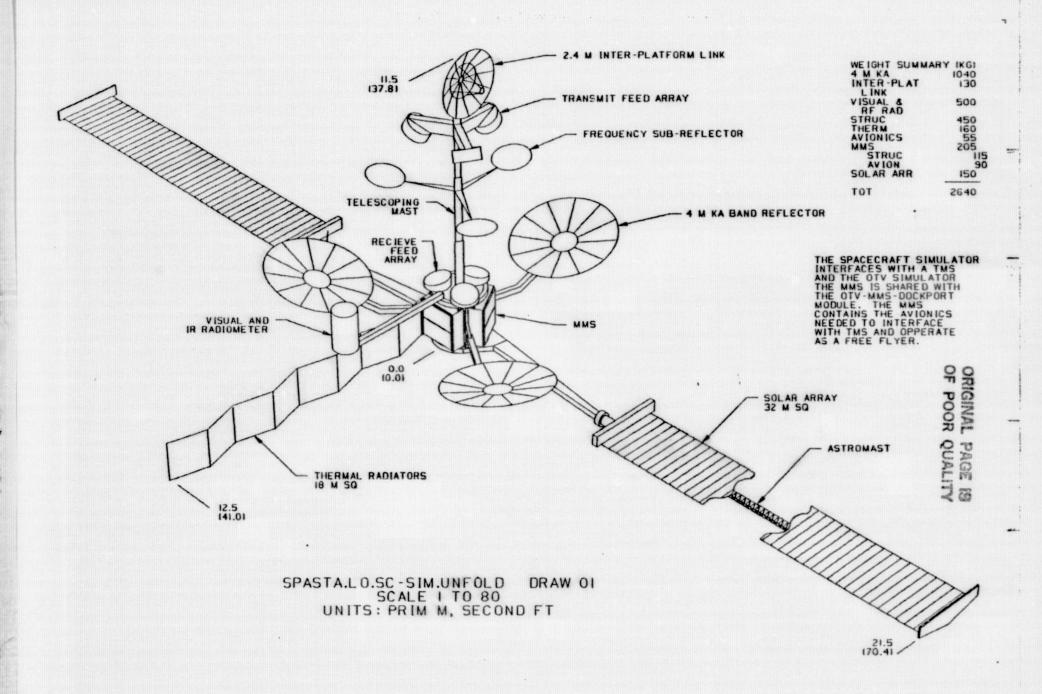
4.5 DIA X 7.3 (14.8 DIA X 24.0) CYL INDRICAL ENVELOPE





SPASTA.LO.SC-SIM.FOLD DRAW OI SCALE I TO 80 UNITS: PRIM M, SECOND FT



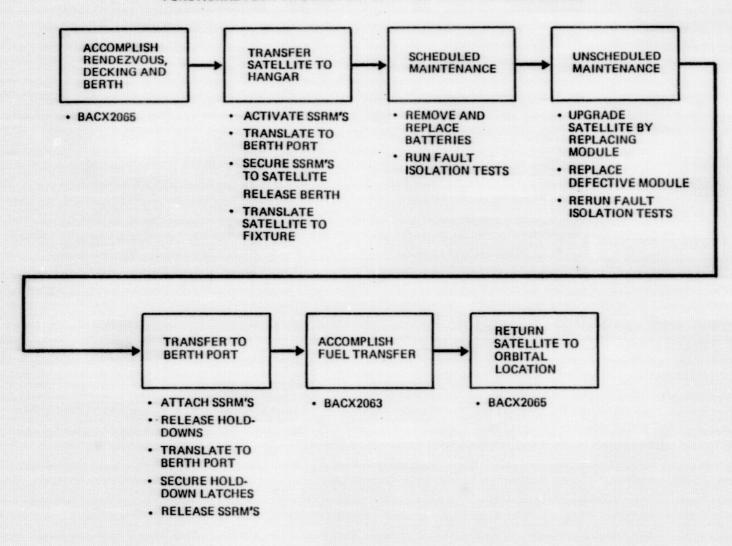


PAYLOAD BLEEDIT DALE CH-DOAD SAT SERV TECH DEH (SS-4 DACK2072	TYPE () Science and Applications (Non-const.)
COPTACT Figure MEITH MILLER Address DOTTHG AMBOSPACE CO	Conmercial (x) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone 206/773-8150 STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 10
	ion of Flight, Days 30
CEDICATIVE SATELLITE SERVICING TECHNOLOGY DEMONSTRATIONS: DEMONSTRATE CAPABILITY TO RETRIEVE SATELLITE AND BRING TO SPACE STATION; MAINTENANCE/UPGRADE OF S/C; ORU REPLACEMENT.	
DESCRIPTION UCE THE THE PREE-FLYER SHULATOR FROM SS-2 (BACK2070) AS THE TEST ARTICLE FOR THIS CERVICING TECHNOLOGY DELO. FLY THE THE BACK TO THE SPACE STATION IN BOTH THE SELF-PLAND ALD ALTO PETELLYE IT WITH ANOTHER THE BRING THE TEST ARTICLE ON-BOARD THE SPACE STATURIES, REPLENSH PROPELLANTS, AND PERFORM OTHER SERVICING TASKS. RETURN THE TEST OFFITAL LOCATION.	ROPELLED HODE
OLLIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apolee, ha 500 Perigee, km 500 Tolerance + Inclination, deg 28.5 Rodal Angle, deg ANY Escape dv Required, m/s	PAGI
POTESTAC/ORIENTATION View Direction () Inertial () Solar () Earth (X) As Truth Sites (If known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	
Operating Standby Pock Voltage, V C) DC Power, U Duration, Hrs/Day C) Continuous Prequency, Hz	

Conitoring Requirements: () Realtime () Realtime () Realtime () Encription/Decription R. () Uplink Required: () On-Board Data Processing Description:	equired on and Rate (KDS):			Frequenc	y (llz):						00		
Data Types: () Analog	g () Digital			llours/Da	У							FP		
Film (Amount): Live TV (Hours/Day): On-Loard Storage (Hbit)				Voice (II Other:	lours/Da	ay):						OF POOR		
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit)			Downlink Downlink	conana Freque	nd r ency	ate: (iMz):					23	O D	
THERIAL () Active () Passive Temperature, deg C Op Hot Heat Rejection, U Op Ho	erational Hinimum n-operational Hinim erational Hinimum n-operational Hinim	iaun:		lian	iaun iaun iaun iaun							AL TO	14	
	TCC													
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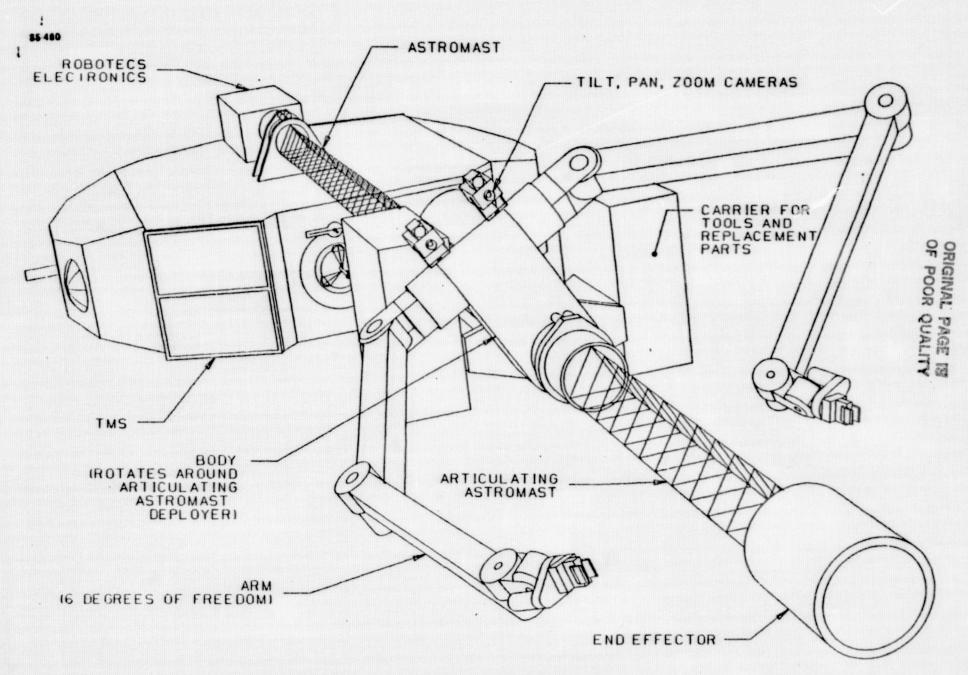
FUNCTIONAL FLOW ON-BOARD SAT SERV TECHNICAL DEMONSTRATION



PAYLOY DELEMENT MALE CODE THETTU CAT UNIVARIED SERV (CS-5) BACK2073	TYPE (Use and Applications (Use and Application) (Use and Application) (Use and Application) (Use and Applicat
CGLTACT Unit HILLER Address BOUING AEROSPACE	() Science and Applications (Hon-comm.) Conmercial (X) Technology Development () Operations () Other () Hational Security Type number (see table A) 15
Telephone 206/733-8150	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 10
Duration Duration	of Flight, Days 14
OBJECTIVE SATELLITE SERVICING TECHNOLOGY DEMONSTRATION: DEMONSTRATE CAPABILITY TO REPAIR/SERVICE FREE-FLYING S/C BY REMOTE CONTROL RESUPPLY AND MARVESTING OF PRODUCTS FROM FACTORY SATELLITE.	
DESCRIPTION USE THE SATILITE ASSEMBLY TEST ARTICLE FROM THE SS-3 TECH DEMO MISSION. THIS TEST ARTICL ASSEMBLY TEST ARTICLE FROM THE SS-3 TECH DEMO MISSION. THIS TEST ARTICLE ASSEMBLY TEST ARTICLE AND PERFORM IN-SITU SERVICING. THIS UDULD INCLUDE RENDEZVOUS & DOCKING SATELLITE SYSTEM DEACTIVATION, COMPONENT REMOVE/REPLACE, PROPELLANT RESUPPLY, MATERIALS MARVESTING, REACTIVATION OF SUBSYSTEMS, AND DEMATING AND RETURN.	resupply/product Presupply/product Presupply/product Presupply/product
CREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, det 28.5 Rodal Angle, det Any Escape dv Required, m/s	PAGE IS
POINTING/ORFERTATION View Lirection () Inertial () Solar () Earth (X) Any Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Epecial Lestrictions (Avoidance)	
Pount () AC () BC Power, U Luration, hrs/Day Operating Standby Pock Yoltage, V Frequency, No	

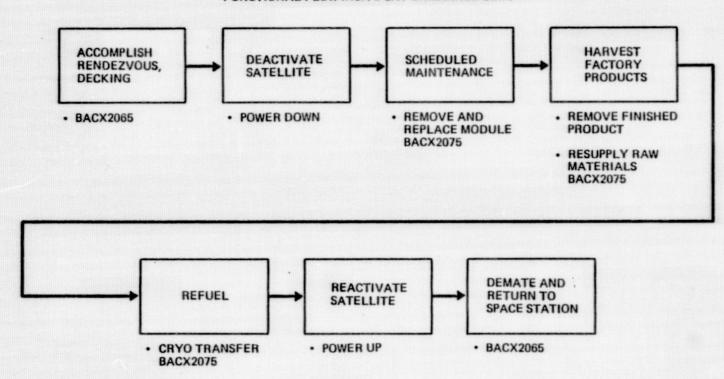
() Encription/Decription () Uplink Lequired: () On-Board Bata Process Pescription:	Command Rate (KI	BS):			1	Freque	icy (IIII	z):								
Data Types: () Ana Film (Amount): Live TV (Lours/Day): On-Board Storage (Lbi	log () Digit	tal			1	Cours/Doice Other:	ay Hours/I)ay)	:							
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SPACECRAFT BOROTIC SEDVICED

FUNCTIONAL FLOW INSITU SAT UNMANNED SERV



PAYLOAD LLEIGHT LAIG SURPACE INTERACTION U/RCS PLUIE EACE/2074	TYPE Science and Applie	otiona (v.
CONTACT. Came DAVID C. PARVIAH Address DOEING AEROSPACE CO	Science and Applia (X) Technology Develop (a) Operations (b) Other (c) Mational Security (c) Type number (see table	Ment
Telephone 206/773-2020	Importance of the Space	e Station to
() Operational () Approved () Planned (X) Candida	te () Opportunity	uld Use
	buration of Filling, Days 96	
OBJECTIVE TO PROVIDE TECHNOLOGY BASE FOR DETERMINING THE CHARACTERIST REACTION CONTROL SYSTEM PLUME FLOW AND MEATING RATES ON AND SUPPLICES. OF PARTICULAR INTEREST IS NOW A PLUME UNION IS IN MOUNTAIN FLOW STATE OF TRANSITIONING TO FREE MOLECULAR FLOW STRUCTURAL EDGES. HEATING OF SECONDARY SUPPLICES UNION ARE SUBJECT PLUME IMPLINGEMENT IS ALSO OF INTEREST.	A FREE	
DESCRIPTION VARIOUS STRUCTURAL SHAPES WILL BE PLACED WITHIN THE PLUME OF THE HISTRUGHENTED TO CATHER DATA ON PLUME MEATING DUE TO DIRECT MAYA ON THE PLUME HEATING RATES AROUND THE SHAPE. THE STRUCT RESOLUTION OF THE STATE TO ALLOW LOCATING THIS SYSTEM ON THE SPACE STATION WOULD PERMIT RECONSTRUCTURES FOR DEGRADATION DUE TO PLUME INPINGEMENT, INVESTIGATION OF THE STATE OF THE SEMBLE TRANSDUCER WHICH MAY FAIL DUE TO THE SEMBLE STATION OF THE SEMBLE TO A PARTICULAR SPACEGRAFT'S GUAL TEST OF THE STATE OF THE SEMBLE STATION OF THE SEMBLE STATION OF THE SEMBLE SPACE STATION OF THE SEMBLE SEMBLE SPACE STATION OF THE SEMBLE SPACE STATION OF THE SEMBLE SPACE STATION OF THE SEMBLE SEMBLE SPACE STATION OF THE SEMBLE S	TUPAL SHAPES AND PROBES WILL HAVE TO BE INVESTIGATION OF DIFFERENT PLUME FLOW STATES. BEFIGURING OF THE STRUCTURAL SHAPES, REPLACEMENT ERE THERMAL ENVIRONMENT, INSPECTION OF THE IGATION OF PLUME RELATED CONTAMINATION AND	ORIGINAL OF POOR
ORDIT CHAPACTERISTICS Geosynchronous Orbit () Yes () No Apogee, La. Inclination, dec Lal Agole, dec Lacape dv Required, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, u	R QUALITY
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Operating Standby Politage, v Precuency, Hr	() Continuous	

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(E) Active () Passive Temperature, deg C Ope	erational Hinimum n-operational Hinimum erational Hinimum n-operational Hinimum	um um		Mariaua Mariaua Mariaua Mariaua Mariaua	uency (IMZ)	<u>-</u>		•		NAL PAGE
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QUIPTENT PHYSICAL CHARACTERIST Location Internal Equipment ID/Function Length: Launch mass, Consumable Ty	() Pressuri 1.00 meters Wi 1.00 meters Wi kg: 100	ized idth: idth:	1.00 i Return i	ressurized Leters Leters Lass, kg: 10		.50 Electrical Control	eters eters	(Stowed) (Deployed	1)	<i>3</i> 2
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EVA Safe RCS thruster Activate lighting Activate remote TV Checkout work area WRTV Gather tools Activate Rms Translate to plume module Service Rms to plume module Translate plume module to RCS thruster Alighn structural shapes at thruster Secure structural shapes Release RMS and stow Hook up wiring Test wiring for continuity Clear thruster area Unlock RCS thruster Test thruster & shape sensors Stow tools Deactivate TV Deactivate lights End EVA

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SYSTEM SUSPECTION S INTEGRATION SUFFERS GROUND TEST CONDUCT

11

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BOEING SUPPORT HOURS
SYSTEM ENGINEERING & INTEGRATION
SOFTWARE ENGINEERING
SYSTEMS GROUND TEST CONDUCT
JYBTEMS FLIGHT TEST CONDUCT
SUPPORT EQUIPMENT DESIGN
SUPPORT EQUIPMENT HEG
TOGLING & SPECIAL TEST EQUIPMENT
SPARES
LIMISON ENGINEERING
DATA
ROGRAM MANAGEMENT (ENG)
PROGRAM MANAGEMENT (MFG) 1203 303 391 0 89 113 732 354 325

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	MANAGEMENT				94							
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183	URFACE INTE	RACTION	W/RCS F	LUME								
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		1
HARDWARE SUBSYSTEM COST (SH)		
81 STRUCTURE	0.021	0.423
SUBSYSTEM HARDWARE SUBTOTAL (#M)	0.021	0.423
SFE/SUBCON/GIVEN COST (*#)		
	v.ů	3.0
SUBCON/GIVEN (81-850) SUBTOTAL . #m.	0.0	0.0
MARDWARE ASSEMBLY & CVD		0.064
HARDWARE SUBTOTAL (SM)		0.487
SUFFORT COST (\$M)		
SYSTEM ENGINEERING & INTEGRATION	0.072	
SOFTWARE ENGINEERING	0.020	
SYSTEMS GROUND TEST CONDUCT	0.030	
SYSTEMS FLIGHT TEST CONDUCT	0.0	
PECULIAR SUPPORT EQUIPMENT	0.006	0.012
FOOLING & SPECIAL TEST EQUIPMENT		0.638
SPAKES		0.042
LIAISON ENGINEERING	0.019	
DATA	4.01-	
FROGRAM MANAGEMENT	0.010	0.057
SUFFORT EFFORT SUBTOTAL (#M)	0.234	0.199
TOTAL (\$M) (NOMINAL SCHEDULE)	0.224	0.530

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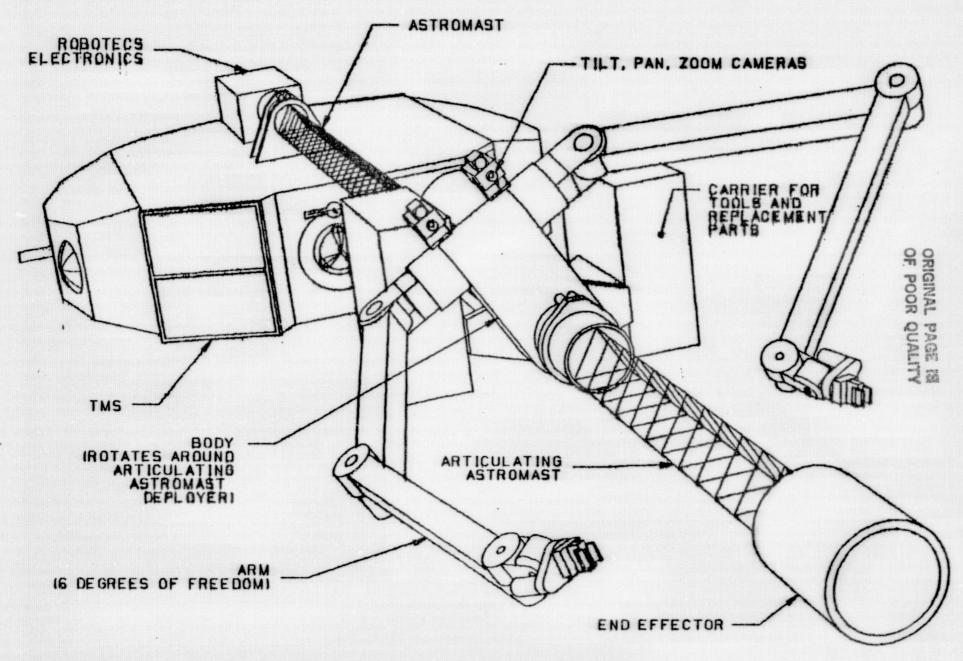
*********** TITLE: SURFACE

PAYLOAD ELEHENT NAME CODE BACX2075		TYPE Science and Applications (Non-comme) Commercial
COUTACT Name N.B. LIEMOHN Address BOEING AEROSPACE	(X) Technology Development () Operations () Other () National Security Type number (see table A) 15	
Telephone 206/773-1764		Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
STATUS () Operational () Approved () Planned (X) Candidat	te () Opportunity	Scale = 7
Desired First Flight, Year: 1997 Number of Flights	s 1 Duration	of Flight, Days 150
OBJECTIVE ROBOTICS TECHNOLOGY DEMONSTRATION: SITUATION MONITORING, ARTIFICIAL INTELLIGENCE, SOFTWARE DEVELOPMENT, MOBILITY CONTEND-EFFECTORS, PROPULSION SYSTEMS, AND STRUCTURES AND MATERIALS.		
DESCRIPTION DEVELOP ROBOTS, TO ACCOMPLISH ASSEMBLY AND MAINTENANCE TASKS SPECIFIC TASKS AND DEMONSTRATE THE CAPABILITIES LISTED IN THE	S. UTILIZE THESE ROBOTS TO A	ORIGINAL OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes () No Apogee, km Inclination, deg Nodal Angle, deg Escape dV Required, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, m	PAGE IS
POINTING/ORIENTATION View Direction Truth Sites (if known): Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	() Earth () Any Field of View (deg)	
POWER () AC () DC Power, U Duration, Hrs/Day Operating 3000 Standby Peak Voltage, V Frequency, Hz	() Continuous	

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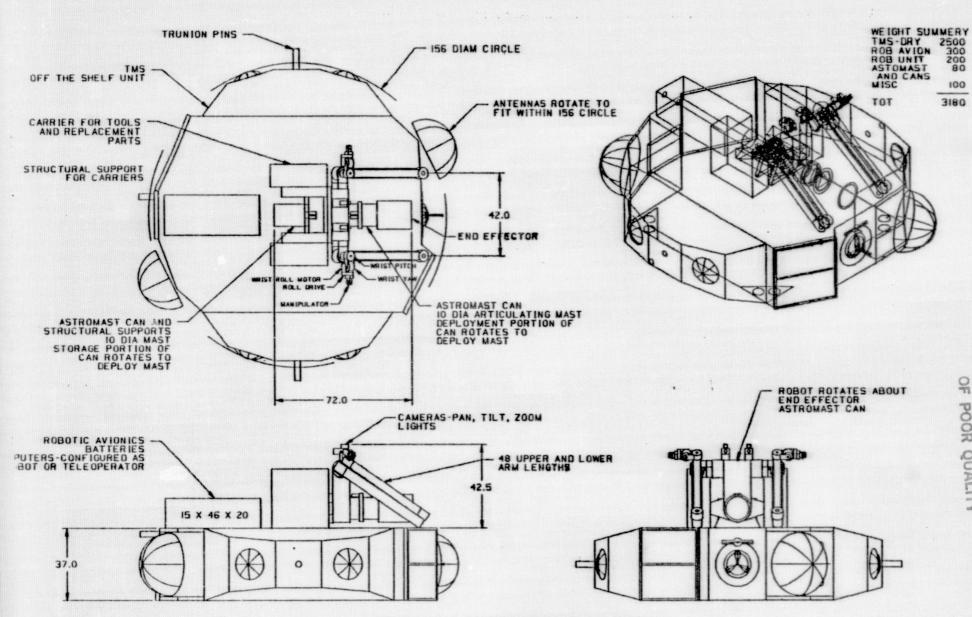
(X) Active () Passive Temperature, deg C Operational Minimum Non-operational Minimum Maximum M								
Temperature, deg C Operational Minimum Maximum	() Uplink Required: Co () On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit): Data Dump Frequency (Per	mmand Rate (KBS): Required () Digital 8.00 Orbit)	Frequency (IIIz) Hours/Day Voice (Hours/Da Other: Downlink comman	y): d rate:			ORIGIN OF POO	
EQUIPMENT PHYSICAL CHARACTERISTICS	THERMAL (X) Active (X) Active (Y) Active (Y) Passive (Y) Passive		Maximum Maximum Maximum	,			AL PAGE I	
CREU REQUIREMENTS Crew Size 5				Height: 1.1 Height: 1.1	meters meters			
Level	CREW REQUIREMENTS							
Level	Skills (See Table B)	Skill 5	8 9 12	I 13 I		<u>-</u>	1	ī
Hours/Day 8.00 4.00 8.00 8.00 1 1 1 1 EVA (X) Yes () No Reason SETUP & ADJUSTMENT Hours/EVA 540 Hours/EVA 540 SERVICING/MAINTENANCE Service: Interval days Consumables kg Man hours required Configuration Changes: Interval days Man-Hours Required Man-Hours Required Returnables kg Returnables K					1 1	<u>-</u>	1	ī
EVA (X) Yes () No Reason SETUP & ADJUSTMENT Hours/EVA 540 SERVICING/MAINTENANCE Interval days Consumables kg Returnables kg Man hours required days Man-Hours Required Deliverables kg Returnables kg Returnables kg Returnables kg Returnables kg Returnables kg Returnables kg					-ii		1	-ī
Service: Interval days Consumables kg Returnables kg Man hours required Configuration Changes: Interval days Man-Hours Required Deliverables kg Returnables kg	EVA (X) Yes () No							
	Service:	Returnables	kg Man hours	required				
			kg keturnable	· · · · · · · · · · · · · · · · · · ·	kg			

		Eoeir	ng-Specific In	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote THS () Remote Manned () Serviced at Station (() Serviced at Station (TMS Retrieved Self-propelle	OPS CODE F FT FM FST d) FST					
Platform Based () Not Serviced () Remote TMS () Remote Manned () Serviced at Station (() Serviced at Station (TMS Retrieved Self-propelle	P PT PM PST d) PS					
Other (X) Space Station Based () Sortie		SS SOR					•
CONSTRUCTION/SERVICING COMPL (X) Low (X) Hedium (1) High	EXITY						0.0
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	0 days 0 days 180 days/ 20 man-d 90 man-d 10 times	ays/year ays/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return							3.50
Support Equipment Length: Length:	meters meters	Width: Width:	meters meters	Height: Height:	meters meters	(Stowed) (Deployed)	
Mass:	kg						
Hanifest Restrictions () No Restrictions () Only with compatible () Fly-Alone () Must have Docking Mod	payloads ule						
Length of Beam Fab Number of Appendages Number of Modules Required t	o Assemble th	e Payload 2					

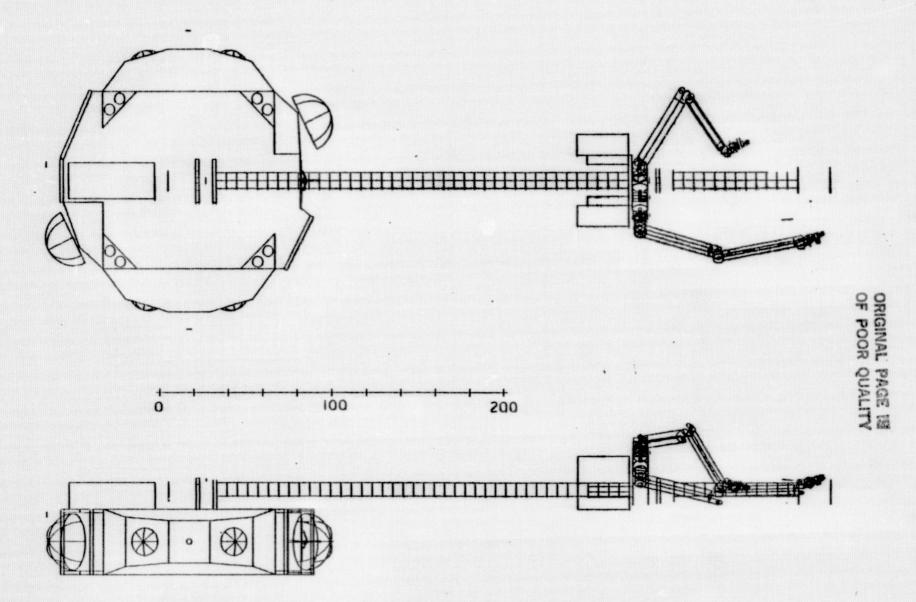


SPACECRAFT ROBOTIC SERVICER

100



SPASTALLO.SC - SERVICER. FOLD DRAW OF SCALE FULL PICTURE SCALE | TO 30 UNITS IN



SPASTA.LO.SC-SERVICER.UNFOLD DRAW LAYOUT SCALE .03

--- PRICE 84 --- ELECTRONIC ITEM

DATE 4-MAR-83		(283010)		FILENA	ME: REID.DAT	
ROBOTICS						
PROTOTYPE QUANTITY	3.000		WEIGHT	900.00	MODE QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELO	MENT	FRO	DUCTION	TOTAL COST	
ENGINEERING DRAFTING	344	10			3440.	
DESIGN	1299				12990.	
SYSTEMS	370					
PROJECT MGMT	59			_	3707.	
PATA	67				5949. 674.	
SUBTOTAL (ENG)	2676			-	26760.	
MANUFACTURING						
PRODUCTION		-		-		
PROTOTYPE	1331	5.		-	13315.	
TOOL-TEST EQ	962	20.		-	9820.	
SUBTOTAL (MFG)	2313	55.		-	23135.	
TOTAL COST	4989	6.			47896.	

PAYLOAD ELEMENT MANE LARTH OBSERVATION THAT DEV MAPS BACK2000		TYPE Science and Applications (Non-comm.) Commercial X Technology Development		
CONTACT Name H.G. REICHLE, JR Address LANGLEY RESERACH CENTER	(X) Technology Development Operations Other National Security Type number (see table A) 12			
Telephone STATUS (Y) Condidate	Importance of the Space Station to this Element - 1 = Low Value, But Could Use 10 = Vital Scale = 3			
() Operational () Approved () Planned (X) Candidate Desired First Flight, Year: Number of Flights		n of Flight, Days		
OBJECTIVE TO PROVIDE TECHNOLOGY BASE FOR THE DEVELOPMENT OF PASSIVE RE OF ATHOSHPERIC TRACE GASES. DESCRIPTION HODULAR INSTRUMENTS WHICH WOULD ALLOW CHANGING OF COMPONENTS		TESTS TO DETERMINE		
SUCH THINGS AS OPTIMUM BANDPASSES, FILTERING, AND SCANNING CONCEPTS AND TARGET GASES. SEE SCIENCE & APPLICATIONS MISSIONS BACKOOO4	COULD BE PERFORMED FOR DIF	FERENT INSTRUMENT OF POOR ORIGINAL		
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Inclination, deg Hodal Angle, deg Escape dV Required, m/s .	Tolerance + Tolerance + Ephemeris Accuracy, m	PAGE IS		
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec . Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	(X) Earth () Any Field of View (deg)			
POVER				
(X) AC () DC Power, W Duration, Hrs/Day				

MATA/COMMUNICATIONS Nonitoring Requirements:								
Honitoring Requirements: () None (X) Encription/Decription R () Uplink Required: Comma (X) On-Board Data Processin Description:	nd Rate (KBS): g Required	Other:	Frequ	ency (M	lz):			
Data Types: (X) Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit)	g (X) Digital		llours Voice Other	(Hours	/Day):			
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit)				and rat			
MERMAL (X) Active () Passive Temperature, deg C Op No Heat Rejection, w Op	erational Minimum n-operational Minimum erational Minimum n-operational Minimum			Maximum Maximum Maximum Maximum				
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: L, m: Launch mass, Consumable T Acceleration	(X) Pressurize W, m: W, m:	H, m: H, m: R	eturn mas	Stowed Deploye s, kg:	ı	E+00		ORIGINAL OF POOR
REW REQUIREMENTS Crew Size	Task Assignments							RE
Skills (See Table B)	Skill	ī	ī		1	'i	ī	PAGE IS
	Level	ı	1	1	1	1	ī	77
	Hours/Day	ı	1		1 .	ı	Ī	< 236
EVA () Yes (X) No	Reason			Hours/E	VA			
					Consu	mables,	kg	
GERVICING/MAINTENANCE Service: Configuration Changes:	Interval, da Returnables, l Interval, day Deliverables,	ys kg kg			Han I	ours lours Rec nables,	quired kg	

PAYLOAD ELEMENT NAME EARTH OBSERVATION INSTR DEVELOP CONTACT Name R.V. HESS Address LANGLEY RESEARCH CENTER	TYPE Science and Applications (Non-comm.) Commercial (X) Technology Bevelopment Operations Other National Security Type number (see table A) 12
Telephone	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned (X) Candid	date () Opportunity Scale = 3
Desired First Flight, Year: 0 Number of Flight	
OBJECTIVE TO PROVIDE THE TECHNOLOGY FOR HIGH PULSE ENERGY AND HIGH I CO2 LASERS WITH HIGH FREQUENCY STABILITY AND WIDE TUNING I LONG LASER LIFE TIMES.	RANGE AND OF POOP
DESCRIPTION THE HISSION WILL PROVIDE THE TECHNOLOGY FOR THE MISSION OF LASER CHARACTERISTICS IN THE SPACE STATION ENVIRONMENT WITH	
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Inclination, deg 0.0 Nodal Angle, deg 0 Escape dV Required, m/s 0.0	Tolerance + 0 - 0 Tolerance + 0 - 0 Ephemeris Accuracy, m 0
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	() Earth (X) Any Field of View (deg) 0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Operating 25 0.00 Standby 0 0.00 Peak 0 0.00 Voltage, V 0 Frequency, Hz	() Continuous

Honitoring Requirements: () None () Realtime () Encription/Decription Required: Command (X) On-Board Data Processing 1	uired	Frequency (MHz)	: 0.00	
Description: Data Types: (X) Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit): Data Dump Frequency (Per (Recording Rate (KBPS)	(X) Digital 0 0.00 0.00	Hours/Day Voice (Hours/Da Other: Downlink comman Downlink Freque	d rate: 0	
Heat Rejection, w Opera	ational Minimum 0 operational Minimum 0 ational Minimum 0 operational Minimum 0	Maximum Maximum	0	
	operational minimum	, , , , , , , , , , , , , , , , , , ,		
QUIPHENT PHYSICAL CHARACTERISTIC () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Type	(x) External (x) Pressurized W, m: 0.00 W, m: 0.00	() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	towed eployed 0.00E+00	ORIGINA OF POO
EQUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, ky Consumable Type Acceleration Second	(x) External (x) Pressurized W, m: 0.00 W, m: 0.00 g: 0	() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	eployed 0	 ORIGINAL PA
QUIPMENT PHYSICAL CHARACTERISTIC () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Type Acceleration Sereu REQUIREMENTS	(x) External (x) Pressurized W, m: 0.00 W, m: 0.00 g: 0 es ensitivity, (g) min:	() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	eployed 0	 ORIGINAL PAGE
QUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Type Acceleration Sereu REQUIREMENTS Crew Size 0	CS (X) External (X) Pressurized W, m: 0.00 U, m: 0.00 g: 0 es ensitivity, (g) min: Task Assignments	() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	eployed 0	ORIGINAL PAGE IS
EQUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Type Acceleration Secret REQUIREMENTS Crew Size 0	CS (() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	eployed 0	ORIGINAL PAGE IS
EQUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Type Acceleration Secret REQUIREMENTS Crew Size 0	CS (() Remote () Unpressurized II, m: 0.00 S II, m: 0.00 D Return mass, kg:	eployed 0	ORIGINAL PAGE IS

		В	oeing-Specific I	nput Data			
MISSION TYPE Free Flyer () Not Serviced () Remote TMS () Remote Manned () Serviced at Statio () Serviced at Statio	on (TMS Retrieved on (Self-propelle	OPS CODE F FT FM FST d) FST					
Platform Based () Not Serviced () Remote THS () Remote Hanned () Serviced at Statio () Serviced at Statio	on (TMS Retrieved on (Self-propelle	P PT PM PST d) PS					
Other () Space Station Base () Sortie	ed .	SS SOR				OF OR	
CONSTRUCTION/SERVICING CO	OMPLEXITY					ORIGINAL I	
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EXPERIMENT OPS Service Frequency	man-c	year ays/year ays/year ays/year /year			. 1	PAGE IS	
Delta Velocities Up Down Aero Return	0.00 0.00 0.00						
Support Equipment Length: Length:	0.00 weters 0.00 meters	Width: Width:	0.00 meters 0.00 meters	Height: Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	
Mass:	0 kg						
Hanifest Restrictions (X) Ho Restrictions () Only with compatible of the compatible	ble payloads Nodule						
Length of Beam Fab Humber of Appendages Humber of Hodules Require	ed to Assemble t	ne Payload	0.00				

PAYLOAD ELEHENT NAME SATELLITE DOPPLER METEOR RADAR T CONTACT Name L.D. STATON Address LANGLEY RESEARCH CENTER 3631	TYPE Science and Applications (Non-comm.) Commercial
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate () Opportunity	10 = Vital Scale = 5
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE DEVELOP ENABLING TECHNOLOGY REQUIRED FOR PUSHBROOM DOPPLER RADAR MEASUREMENT OF GLOBAL RAINFALL RATES AND OCEAN SURFACE WIND VECTOR ASSOCIATED WITH STORM SYSTEMS AND OTHER SPECIAL METEORLOGICAL FEATURES. DEVELOPMENT TECHNIQUES USING MILLIMETER WAVES WILL ALSO BE EVALUATED TO PROVIDE THREE DIMENSIONAL DEFINITION OF NON PRECIPITATING CLOUDS.	
DESCRIPTION A HULTIFREQUENCY SPACEBORNE METEOROLOGICAL RADAR WILL BE ASSEMBLED FOR IN-ORBIT OPERAT. FORM SO THAT DIFFERENT AND/OR ADDITIONAL RECEIVER CHANNELS AND ANTENNA BEAMS CAN BE IM EXPERIMENT MATURES TOWARDS A PROOF-OF-CONCEPT DESIGN FOR POTENTIAL OPERATIONAL USE. SEE SCIENCE & APPLICATIONS MISSION BACX0003	IONS IN A MODULARIZED ORIGINAL PA
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 - Inclination, deg 60.0 Tolerance + 0 - Nodal Angle, deg 0 Ephemeris Accuracy, m Escape dV Required, m/s 0.0	108
POINTING/ORIENTATION View Direction () Inertial () Solar (X) Earth () Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.08 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg) 4	0.00
POWER () DC Power, W Duration, Hrs/Day	
Operating 3000 1.00 Standby 300 0.00 (X) Continuous Peak 3000 0.00 0.00 Voltage, V 0 Frequency, IIz 0	

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DATA/COMMUNICATIONS Liountoring Requirements: () None () Encription/Decription Re () Uplink Required: Comman	au i wad		uency (M	z): 0.00	4		
(x) Uplink Required: Comman On-Board Data Processing Description: Data Types: (X) Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit): Data Dump Frequency (Per Recording Rate (KBPS)	8:08 8:08	Hour Voic Othe Down	s/Day e (Hours/ er:	0.00	0.00		
THERIAL							
(X) Active () Passive Temperature, deg C Ope Non Heat Rejection, w Ope Non	-operational Minimum	-10 0 200 0	Maximum Maximum Maximum Maximum	55 200 0			
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 0.0 L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration	(X) Pressurized 0 W, m: 0.00 0 W, m: 0.00 kg: 0	() Remot () Unpre H, m: H, m: Return ma	0.00 0.00 0.00 ass, kg:	Stowed Deployed : 0.00E+00			ORIGINAL PAGE IS
CREW REQUIREMENTS Crew Size 0	Task Assignments						AG
Skills (See Table B)	Skill	·I	·	<u>'</u>			5 %
	Level	ı	1	1 1	ī		~
	Hours/Day	ı	1	1 1	ī		
EVA (X) Yes () No	Reason		Hours/EV	0.00 A			
SERVICIUG/MAINTENANCE Service:	Interval, days	0		Consumables	, kg	0	
Configuration Changes:	Returnables, kg Interval, day Deliverables, kg	0 0 0		Man hours Man/Hours R Returnables	equired	0.00	

SPECIAL CONSIDERATIONS/See Instructions

PAYLOAD ELEMENT NAME HITCROUAVE REMOTE SENS TECH BACX2004	() Science and Applications (Non-comm.)
CONTACT Name R.F. HARRINGTON Address LANGLEY RESEARCH CENTER	() Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 12
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	l = Low Value, But Could Use 10 = Vital Scale = 5
Desired First Flight, Year: 0 Number of Flights 0 Duration	n of Flight, Days 0
DESCRIPTION A INLTIPLE FREQUENCY, MULTIPLE BEAM IMAGING MICROWAVE RADIOMETER SYSTEM WOULD BE DEVEL SPACE TO MEASURE SEVERAL GEOPHYSICAL PARAMETERS SIMULTANEOUS. THESE PARAMETERS ARE SO SURFACE TEMPERATURE, OCEAN SURFACE WIND SPEED, RAIN RATE, SEA ICE CLASSIFICATION DATA SEE SCIENCE & APPLICATIONS MISSIONS BACKOO22 & 0023.	IL MOISTURE, SEA
	Q PA
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 Inclination, deg 250.0 Nodal Angle, deg 0 Escape dV Required, m/s 0.0	- 8 - 8
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.10 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) POINTING/ORIENTATION (X) Earth () Any Field of View (deg)	30.00
POWER () AC (X) DC Power, W Duration, Hrs/Day	
Operating 200 0.00 Standby 30 0.00 (X) Continuous Peak 300 0.00 Voltage, V 78 Frequency, Hz 0	

to a supply to the

ERVICING/HAINTENANCE Service:	Interval, days Returnables, kg	0	Consumables, kg Han hours Han/Hours Required	0.00 0.00
EVA () Yes (X) No	Reason	Hours/EV	A 0.00	
	Hours/Day	1 1	1 1 1	
	Level	1 1	1 1 1	- 100
Skills (See Table B)	Skill	1 1	<u> </u>	5 m
REW REQUIREMENTS Crew Size 0	Task Assignments			PAG
QUIPMENT PHYSICAL CHARACTERISTI Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Typ Acceleration S	(X) Pressurized W, m: 0.00 W, m: 0.00	() Remote () Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed : 0.00E+00	ORIGINAL PAGE 19
HERMAL (X) Active () Passive Temperature, deg C Oper Non- Heat Rejection, w Oper Non-	ational Minimum operational Minimum ational Minimum operational Minimum	0 Maximum 0 Maximum 0 Maximum 0 Maximum	0 0 0 0	•
Data Types: (X) Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Recording Rate (KBPS)	8:88 Orbit) 0	Hours/Day Voice (Hours/I Other: Downlink comma Downlink Frequ		
Honitoring Requirements: () None () Realtime () Encription/Decription Req () Uplink Required: Command (X) On-Board Data Processing Description:	(X) Offline () Other uired Rate (KBS): 0	: Frequency (MHz	2): 0.00	

SPECIAL CONSIDERATIONS/See Instructions

PAYLOAD ELEMENT NAME EARTH FEATURE IDENTIFICATION CONTACT Name R. HILL Address JOHNSON SPACE CENTER	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 12
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital Scale = 8
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
TO USE A MANHED EARTH OBSERVATORY TO LOCATE AND STUDY TRANSIENT PHENOMENA AND TO SUPPORT REHOTE SENSING RESEARCH WITH THE GOAL OF DEFINING ANALYSIS TECHNIQUES AND SYSTEMS FOR USE IN REMOTE SENSING APPLICATIONS. DESCRIPTION BASIC RESEARCH AND SCIENTIFIC STUDIES - MAN COULD PLAY AN IMPORTANT ROLE IN ORIENTING AND RECORD PHENOMENA THAT ARE TRANSITORY IN EITHER TIME OR LOCATION. BY USING REAL-TIM PLAY AN IMPORTANT ROLE IN SELECTING THE BEST INSTRUMENTATION TO RECORD WHAT HE WAS OBS SELECTIVELY TRANSMIT APPROPRIATE DATA TO THE GROUND FOR CONSULTATION WITH GROUND BASED OBSERVER COULD ALSO PLAY AN IMPORTANT ROLE IN FINE TUNING THE POINTING ANGLES AND IMAG TO ACQUIRE DATA FROM GROUND SITES OF KNOWN LOCATION. THIS WOULD BE PARTICULARLY IMPORT WITH MARROW FIELDS OF VIEW OR HIGH SPATIAL RESOLUTION WERE INVOLVED.	E DISPLAYS HE COULD ERVING. MAN COULD EXPERTS. AN ONBOARD E MOTION COMPENSATION
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Nodal Angle, deg 0 Ephemeris Accuracy, m Escape dV Required, m/s 0.0	PAGE 120
POUNTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg)	0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Operating 0 0.00 () Continuous Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

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Monitoring Requirements: () None () Realtime () Encription/Decription Re () Uplink Required: Comman (X) On-Board Data Processing Description:	() Offline () Others equired ad Rate (KBS): 0	Frequency (MIz):	0.00	
(X) On-Board Data Processing Description: Data Types: (X) Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit): Data Dump Frequency (Per Recording Rate (KBPS)	0.00 0 0.00	Hours/Day Voice (Hours/Day Other: Downlink command Downlink Frequen	rate: 0	
Heat Rejection, w Ope	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Maximum Maximum Maximum Maximum	0 0 0 0	
QUIPMENT PHYSICAL CHARACTERIST Location () Internal	rics	() n		
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0	H, m: 0.00 De Return mass, kg:	owed ployed 0.00E+00	OF OR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg:	ployed	ORIGINA OF POOI
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS	(X) Pressurized (X) W, m: 0.00 (X) M, m: 0.00 (X) M	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg:	ployed	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) W, m: 0.00 (X) m: 0.00	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg:	ployed	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Pressurized (X) W, m: 0.00 (X) M, m: 0.00 (X)	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg:	ployed	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (00 W, m: 0.00 (00 W, m: 0.00 (00 kg: 0 (00 W, m: 0.00 (00 W, m:	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg:	ployed	ORIGINAL PAGE IS OF POOR QUALITY
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pressurized (X) W, m: 0.00 (X) M, m: 0.00 (X) M	() Unpressurized H, m: 0.00 St H, m: 0.00 De Return mass, kg: : 0.00E+00 max:	ployed 0.00E+00 	POOR

SPECIAL CONSIDERATIONS/See Instructions CLEAN OUTSIDE ENVIRONMENT

		1	Boeing-Specific I	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote THS () Remote Hanned () Serviced at Stati () Serviced at Stati	ion (TMS Retrieve	OPS CODE FFT FH d) FST ed) FS					
Platform Based () Not Serviced () Remote TMS () Remote Hanned () Serviced at State () Serviced at State	ion (TMS Retrieve ion (Self-propell	P PT PM PST ed) PS					
Other () Space Station Bas () Sortie	sed	SS SOR					•
CONSTRUCTION/SERVICING (COMPLEXITY						OF POOR
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	man- man-						RQUALITY
Delta Velocities Up Down Aero Return	0.00 8:88						
Support Equipment Length: Length:	0.00 meters 0.00 meters	Width: Width:	0.00 meters 0.00 meters	Height: Neight:	0.00 meters 0.00 meters	(Stowed) (Deployed)	
Mass:	0 kg						
Manifest Restrictions (X) No Restrictions () Only with compating Fly-Alone () Must have Docking	ible payloads g Module						
Length of Bean Fab Humber of Appendages Humber of Hodules Requi	red to Assemble t	he Payland	0.00				

PAYLOAD ELEMENT NAME EARTHBOUND ORIENTED INST DEV CODE BACK2007	TYPE Science and Applications (Non-comm.)
CONTACT Name U.E. HOWELL Address LANGLEY RESEARCH CENTER	(X) Technology Development (A) Operations (B) Other (B) National Security (C) Type number (see table A) 12
Telephone .	Importance of the Space Station to
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 5
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
DESCRIPTION PRESENT SPACE INSTRUMENTATION UNICH IS INTENDED TO SENSE EARTH-BASED PHENOMENA IS RESTRUCTED BANDS IN THE ELECTROMAGNETIC SPECTRUM (E.G. THE VISIBLE AND RELATIVELY NARROW SPECULATION AND UNDERSTANDING OF VARIOUS PHYSICAL PROCESSES INCREASE, WE WILL NEED TO I AN INCREASINGLY WIDE VARIETY OF ATTRIBUTES. THESE SENSORS WILL, OF COURSE, BE INITIALLY TESTING PERFORMED ON THE EARTH; HOWEVER, FULL OPERATIONAL POTENTIAL CAN BE BEST OBTAINITESTING IS DONE FROM THE SPACE STATION. SEE SCIENCE & APPLICATIONS MISSION BACKOO49.	RF REGIONS). AS OUR DEVELOP SENSORS WITH Y BUILT AND LIMITED ED IF DEVELOPMENTAL OOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Nodal Angle, deg 0 Ephemeris Accuracy, m Escape dv Required, m/s 0.0	PAGE IS
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg)	0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Operating 0 0.00 () Continuous Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, llz 0	

Nonitoring Requirements: () None () Realtime () Encription/Decription Re () Uplink Required: Comman (X) On-Board Data Processing Description:	nd Rate (KBS): 0	Fr	equency (Miz	0.00		
Data Types: (X) Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	0	Vo	urs/Day ice (Hours/Da her:	ay): 0.00 0.00		
Data Dump Frequency (Per Recording Rate (KBPS)	0.00 0.00		wnlink comma wnlink Frequ		0.00	
Heat Rejection, w Ope	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	0 0 0	Maximum Maximum Maximum Maximum	0 0 0 0		
And the state of t						00
Equipment 1D/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty	(X) Pressurized 00	H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	Stowed Deployed 0.00E+00		ORIGINAL PAG
Equipment 1D/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration	(X) Pressurized (X) Pressurize	() Unp H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	Deployed		 PAGE
Equipment 1D/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS	(X) Pressurized 00 V, m: 0.00 00 V, m: 0.00 kg: 0 ypes Sensitivity, (g)	() Unp H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	Deployed		PAG
Equipment 1D/Function L, m: 0.6 L, m: 0.6 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0 ypes Sensitivity, (g) m Task Assignments	() Unp H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	Deployed	 - 	PAGE
Equipment 1D/Function L, m: 0.6 L, m: 0.6 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Mressurized (X) Mressurized (X) Mressurized (X) Pressurized (X) Pressurize	() Unp H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	Deployed	 <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u>	PAGE
L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Mressurized (X) Mressurized (X) Mressurized (X) Pressurized (X) Pressurize	() Unp H, m: H, m: Return	ressurized 0.00 0.00 mass, kg:	0.00E+00	 	PAGE

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Boeing-Specific Input Data
                                                        OPS CODE
MISSION TYPE
   Free Flyer
        Not Serviced
                                                            FI
        Remote THS
Remote Hanned
        Serviced at Station (TMS Retrieved)
                                                            FST
      ) Serviced at Station (Self-propelled)
                                                            FS
   Platform Based
                                                            P
        Not Serviced
                                                            PT
        Remote This
        Remote Manned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                            PM
PST
                                                            PS
    Other
    Space Station Based
Sortie
                                                            SS
                                                                                                                                                  OF POOR QUALITY
                                                            SOR
CONSTRUCTION/SERVICING COMPLEXITY
        Low
        Hedium
      ) High
Operations Times
   OTV Up/Down
                                             days
    OTV or THS on Orbit
                                             days
                                             days/year
man-days/year
   Mission Use
IVA Service
   EVA Service
                                             man-days/year
   Experiment Ops
                                             man-days/year
   Service Frequency
                                             times/year
Delta Velocities
                               8:88
   Up
Down
Aero Return
Support Equipment
                               0.00 meters
0.00 meters
                                                      Width:
                                                                    0.00 meters
0.00 meters
                                                                                                           0.00 meters
0.00 meters
                                                                                                                                (Stowed)
(Deployed)
                Length:
Length:
                                   0 kg
                llass:
Manifest Restrictions
    (X) No Restrictions
        Only with compatible payloads
        Fly-Alone Hust have Docking Hodule
                                                                     0.00
Length of Beam Fab
Humber of Appendages
Number of Hodules Required to Assemble the Payload
```

PAYLOAD ELEHENT NAME CODE LARGE SOLAR COLL BACX2008	TYPE (Not and Analizations (Non-see)
CONTACT Hate E.J. CONWAY Address NASA-LANGLEY RESEARCH CENTER	() Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	10 = Vital Scale = 10
Desired First Flight, Year: 1995 Number of Flights Duration	of Flight, Days
OBJECTIVE TO DEVELOP AND DEPLOY A LARGE PERMANENT MIRROR FACILITY TO CAPTURE AND CONCENTRATE AND SOLAR RADIATION. TO ACCURATELY ESTABLISH THE OPTICAL CHARACTERISTICS OF THIS FACILITY THROUGH SYSTEMATIC MEASUREMENTS, AND TO ASSESS THE LONG-TERM STABILITY OF THE OPTICAL CHARACTERISTICS OF THE MIRROR.	
DESCRIPTION THE DISSION WILL PROVIDE THE FACILITY NECESSARY FOR OTHER ADVANCED ENERGETICS MISSIONS, DEVELOPMENT AND DEPLOYMENT OF A LARGE STABLE CONCENTRATING REFLECTOR, AND WILL PERMIT A STABILITY OF 1) REFLECTING OPTICAL COATINGS, AND 2) MECHANISMS FOR PRODUCING AND HOLDING REFLECTOR SHAPES IN THE SPACE ENVIRONMENT.	. IT WILL REQUIRE ASSESSMENT OF THE NG OPTICAL QUALITY
	OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Tolerance + - Inclination, deg 28.5 Nodal Angle, deg Escape dV Required, m/s	PAGE
POINTING/ORIENTATION View Direction () Inertial (X) Solar () Earth () Any Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	₹∞
POWER () AC (X) DC Power, W Duration, Nrs/Day Operating 500 12 Standby () Continuous Peak Voltage, V Frequency, Nz	

Consider the content of the conten	ng Required og (X) Digita):	ı	ther:	Hours Voice Other	ink com	Day):	e: Miz):			
Recording Rate (KEPS) THERMAL () Active (X) Passive Temperature, deg C 0 Heat Rejection, w 0		n nimum			Maximum Maximum Maximum Maximum					
L, m: 1 Launch mass Consumable	2 W, m:	3 12	H, Re	m: m: turn ma:	10 ss, kg:	Stowed Deploy	red			ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size	Task Assignm	ents								2 P
Skills (See Table B)	Skill	11	12	13	1 9	1	.1	ī ī		PAGE IS
	Level	1 3	13	1 3	1 3	1	1	ī		7 m
	Hours/Day	ı	1	1	1	1	ı	ī		
EVA (X) Yes () No	Reason CONST	RUCTION	N		Hours/EV	A				
SERVICING/MAINTENANCE Service: Configuration Changes:	Interval Returnab Interval Delivera	. day		90		Cons	umables lours	s, kg	8.000	,
SPECIAL CONSIDERATIONS/See In A SIGNIFICANT EFFORT WILL BE TO CHARACTERIZE ITS OPERATION INSTALL CHECKOUT, OPERATE, A A MISSION LIFE THAT IS VERY I	structions REQUIRED TO DEPLO	Y A LAI	RGE HIGH	-QUALIT	Y REFLECT	OR. MOR	E EFFOI	RT VILL P	E NEEDED	

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Boeing-Specific Input Data
MISSION TYPE
                                                                 OPS CODE
    Free Flyer
( ) Not Serviced
{ Remote THS
Remote Manned
                                                                     FT
    (X) Serviced at Station (TMS Retrieved)( ) Serviced at Station (Self-propelled)
                                                                     FST
                                                                     FS
    Platform Based
( ) Not Serviced
                                                                     PT
          Remote THS
       Remote Nanned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                                     PH
                                                                     PS
                                                                                                                                                                        OF POOR QUALITY
    Other
      Space Station Based
Sortie
                                                                     SS
CONSTRUCTION/SERVICING COMPLEXITY
         Low
    (x) Hedium
     ( ) High
Operations Times
    OTV Up/Down
                                                    days
    OTV or THS on Orbit
                                                    days
                                                   days/year
man-days/year
man-days/year
    Mission Use
IVA Service
    EVA Service
    Experiment Ops
Service Frequency
                                                    man-days/year
times/year
Delta Velocities
    Up
    Down
    Aero Return
Support Equipment
                                                                                                                                                  (Stowed)
(Deployed)
                   Length:
Length:
                                           meters
                                                                                     meters
                                                                                                                                  meters
                                           meters
                                                                                     meters
                                                                                                                                  meters
                  Mass:
                                           kg
Manifest Restrictions
     (X) No Restrictions
       Only with compatible payloads
Fly-Alone
Nust have Docking Module
Length of Beam Fab
Humber of Appendages
Humber of Hodules Required to Assemble the Payload
                                                                                   20
```

- - - FRICE 64 - ELECTRONIC LIEN

DATE 7-MAR-83

(283010)

FILENAME: REID2.DAT

LARGE SOLAR COLLECTOR

	INI	I WEIGHT - Lage. 00	MODE
PROTOTYPE QUANTITY	3.000 UNI	r Valumë 96.00	QUANTITY/NHA
PROGRAM COST(\$ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	2796.		2796.
DESIGN	9103.		7103.
SYSTEMS	1665.		1665.
PROJECT MGMT	7365.		7365.
DATA	764.		764.
SUBIDIAL (ENG)	21692.		21692.
MANUFACTURING			
PRODUCTION	-		-
PROTOTYPE	23968.		23966.
TOOL-TEST EQ	12879.		12879.
SUBTOTAL (MFG)	36847.		36847.
TOTAL COST	58539.		56539.

OF POOR QUALITY

TIME 0:33

Filement City Inc

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TOOL-EST EG			2979.			
SUBSTAL (MFG)			10041.			
JOSOTHE (MFG)	,,,,,					
STAL COST	58539.		56537			
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1 70 1	5 6 675.		06076.			

PAYLOAD ELEMENT MAME MATERIALS & COATING TECHNOLOGY CONTACT Name DAVID ENNIS Address AKES RESEARCH CENTER	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 10 Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 6	
Telephone STATUS () Operational () Approved () Planned () Candidate (X) Opportunity		
Desired First Flight, Year: 1993 Number of Flights Duratio	on of Flight, Days	
DESCRIPTION DATA WILL BE OBTAINED ON THE EFFECT OF GIVEN CHARACTERISTICS OF THE SPACE ENVIRONMENT. PROPERTIES OF MATERIALS AND COATINGS ANTICIPATED FOR USE IN FUTURE SPACE ENVIRONMENT DECREASE IN THE ABSORBTIVITY OF LOW-SCATTER OPTICAL BLACK SURFACES WHEN EXPOSED TO SO SOLAR WIND/COSMIC RAY HIGH ENERGY PARTICLE FLUXES. METEOROID VENTING OF THE INTERSTIT INSULATING MATERIALS; DECREASES IN THE YOUNG'S MODULUS OF RESIN-MATRIX STRUCTURAL CONCOMIC-RAY DAMAGE AND VACUUM EFFECTS; AND PARTICLE CONTAMINATION OF THE THERMAL-CONTINEAT PIPES ARE ALSO TECHNOLOGY CONCERNS. THE DEVELOPED HISSION FACILITY WILL ALSO MATERIALS.	PECIFIC AREAS OF INVEST- NGS AS WELL AS THE DLAR TILUMINATION AND	ORIGINAL OF POOR
HEAT PIPES ARE ALSO TECHNOLOGY CONCERNS. THE DEVELOPED MISSION FACILITY WILL ALSO HAVE INVESTIGATIONS IN THE AREA OF SPACE POLYMER CHEMISTRY.	VE THE CAPABILITY FOR	AL.
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + Inclination, deg Tolerance + Nodal Angle, deg Escape dV Required, m/s	=	AGE IS
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	,	
POWER () AC () DC Power, W Duration, Hrs/Day		
Operating 0 Standby () Continuous Peak Voltage, V Frequency, Hz		

DATA/COLDULTCATIONS Uonitoring Requirements: () Rone () Realtim () Encription/Decription () Uplink Required: Comm (X) On-Board Data Processi Description:	e () Offline () Other Required and Rate (KBS):	: Frequency (MIz):	
Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	Hours/Day 0.00 Voice (Hours/Day): Other: Downlink command rate:	
Data Dump Frequency (P Recording Rate (KBPS)			
THERMAL (X) Active (X) Active (X) Active (Y) Passive (X) Passive (Y) Passive (X) Passive (Y) Passive	perational Minimum on-operational Minimum perational Minimum on-operational Minimum	Maximum Maximum Maximum Maximum	
EQUIPMENT PHYSICAL CHARACTERIA () Interna Equipment ID/Function L, m: L, m: Launch mass Consumable Acceleratio	(X) Pressurized W, m: W, m: Fypes	() Remote () Unpressurized H, m: Stowed H, m: Deployed Return mass, kg: : 0.00E+00 max: 0.00E+00	ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size	Task Assignments		2 P
Skills (See Table B)	Skill	<u> </u>	PAGE IS
	Level		77
	Hours/Day	1 1 1 1 1	
EVA () Yes (X) No	Reason		
SERVICING/NAINTENANCE Service:	Interval, days	Consumables, kg	
Configuration Changes:	Returnables, kg Interval, day Deliverables, kg	Man hours Man/Hours Required Returnables, kg	

SPECIAL CONSIDERATIONS/See Instructions HIS MISSION INTEGRATED INTO BACK2035

```
Boeing-Specific Input Data
MISSION TYPE
Free Flyer
                                                      OPS CODE
        Hot Serviced
Remote THS
Remote Manned
                                                          FT
        Serviced at Station (THS Retrieved)
                                                          FST
        Serviced at Station (Self-propelled)
                                                          FS
   Platform Based
      ) Not Serviced
                                                          P
        Renote THS
                                                          PT
                                                          PM
PST
        Remote Manned
        Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                          PS
   Other
     Space Station Based
Sortie
                                                          SS
                                                          SOR
CONSTRUCTION/SERVICING COMPLEXITY
       Low
        Hedium
     ) High
Operations Times
   OTV Up/Down
                                           days
   OTV or THS on Orbit
                                           days
                                           days/year
man-days/year
   Mission Use
TVA Service
   EVA Service
                                           man-days/year
   Experiment Ops
                                           man-days/year
   Service Frequency
                                           times/year
Delta Velocities
   Up
   Down
Aero Return
Support Equipment
                                                                                                                           (Stowed)
(Deployed)
               Length:
Length:
                                                                                        Height:
                                    meters
                                                    Width:
                                                                       meters
                                                                                                             meters
                                                                                                             meters
                                    meters
                                                                       meters
               Hass:
                                    kg
Manifest Restrictions
    (X) No Restrictions
        Only with compatible payloads
     Fly-Alone
Must have Docking Module
Length of Beam Fab
Number of Appendages
Number of Modules Required to Assemble the Payload
```

PAYLOAD ELEMENT NAME CRYOGERIC FLUID STORAGE TECH CODE DACX2015	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Hame S.C. AYDECOTT Address LEWIS RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 16
Telephone 216/433-4000 X66	Importance of the Space Station to this Element 1 = Low Value, But Could Use
() Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO DEVELOP THE TECHNOLOGY FOR ADVANCED INSULATION AND LONG LIFE REFRIGERATION/LIQUEFACTION SYSTEMS TO PROVIDE LONG TERM ORBITAL THERMAL CONTROL OF CRYOGENIC LIQUID STORAGE AND SUPPLY TANKS. DESCRIPTION SUBSCALE CRYOGENIC FLUID STORAGE TANKS AND REFRIGERATION/LIQUEFACTION SYSTEMS WOULD BE	TECTED TO ESTABLISH
THERMAL PERFORMANCE AND USEFUL LIFE DURING THE EARLY PHASES OF THE SPACE STATION EVOLUSELECTED CONCEPTS WILL THEN PROVIDE DESIGN CRITERIA FOR CRYOGENIC FLUID STORAGE AND SUPPROVIDE SPACE OPERATIONS CENTER CONSUMABLES AND ORBIT TRANSFER VEHICLE PROPELLANTS.	OF POOR OF POO
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Nodal Angle, deg 0 Escape dV Required, m/s 0.0	O ALITY
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Operating 40 0.00 () Continuous Standby 0 0.00 () Continuous Peak 0 0.00 () Frequency, IIz 0	

ATA/COMMUNICATIONS Unitoring Requirements: () None () Realtime () Encription/Decription Re() Uplink Required: Command On-Board Data Processing Description:	() Offline () Oth quired d Rate (KBS): 0 Required		quency (Mz):	0.00		
Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Recording Rate (KBPS)	0:00 0:00	Voi Oth Dov	rs/Day ce (Hours/Day er: mlink command mlink Frequen	rate:	0.00	
Heat Rejection, w Ope	rational Minimum -operational Minimum rational Minimum -operational Minimum	0 0 0 0	Maximum Maximum Maximum Maximum	0 0 0 0		
QUIPHELT PHYSICAL CHARACTERIST Location () Internal	ICS () External (X) Pressurized	S Remo	te essurized			99
L, m: 0.0 Launch mass, Consumable Ty	0 W, m: 0.00 0 W, m: 0.00 kg: 0	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	owed ployed 0.00E+00		OF POOR C
L, w: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration	0 W, m: 0.00 0 W, m: 0.00 kg: 0	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	ployed		0.53
L, m: 0.00 L, m: 0.00 Launch mass, Consumable Ty Acceleration	0 W, m: 0.00 0 W, m: 0.00 kg: 0 pes Sensitivity, (g)	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	ployed		 0.53
L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS Crew Size 0	O W, m: 0.00 kg: 0.00 seg: 0.00 Sensitivity, (g)	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	ployed	 	 F POOR QUALITY
L, w: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REU REQUIREMENTS Crev Size 0	0 W, m: 0.00 kg: 0.00 kg: 0 O.00 sepes Sensitivity, (g) m Task Assignments Skill	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	ployed		0.53
L, w: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	0 W, m: 0.00 kg: 0.00 kg: 0 0.00 Fee Sensitivity, (g) Fee Sensitivity, (g) Fee Sensitivity Fee	H, m: H, m: Return m	0.00 St 0.00 De ass, kg:	ployed	 <u>_</u> _ <u>_</u>	0.53

SPECIAL CONSIDERATIONS/See Instructions
THIS TON HAS BEEN INTEGRATED WITH BACK2064.

PAYLOAD ELERT HAME CRYOGENIC LIFETINE TECHNOLOGY BACK2016 CONTACT Name DAVID EMMIS Address AMES RESEARCH CENTER	TYPE {
Telephone 415/965-6525 STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
	n of Flight, Days 0
DESCRIPTION THE PROPOSED HISSION WILL EVALUATE DIVERSE ADVANCED ACTIVE AND PASSIVE TECHNOLOGIES F	OR THE MAINTENANCE OF
CRYOGENIC TEMPERATURES IN SPACE ON A MULTI-YEAR TIMESCALE. CANDIDATE TECHNOLOGICAL AR INCLUDE, AMONG OTHERS, THE CONTACTLESS OPERATION OF MAGNETIC BEARINGS, THE PASSIVE OR SYSTEM (PODS), AND THE DROPLET RADIATOR. A SPACEBORNE CRYOGENIC FACILITY OF THIS TYPE AN OPPORTUNITY FOR TECHNOLOGICAL AND SCIENTIFIC EXPERIMENTS INCLUDING THE TESTING OF STABILITY OF STRUCTURAL MATERIALS UNDERGOING THERMAL CYCLING AND CRITICAL LOW-TEMPERA	EAS TO BE INVESTIGATED BITAL DISCONNECT WILL ALSO PROVIDE THE DIMENSIONAL TURE PHYSICS INVESTIGAT OR OR OR OR OR OR OR OR OR OR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 Inclination, deg 0.0 Tolerance + 0 Rodal Angle, deg 0 Escape dV Required, m/s 0.0 Ephemeris Accuracy, m	- 00 PUALITY
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POWER () AC () DC Power, U Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

TO A LANGUE TO

Houitoring Requirements: () Rone () Realtime () Encription/Decription Rolling Required: Command On-Board Data Processing Description:	() Offline () Other equired nd Rate (KBS): 0 g Required	Frequency (M	Hz): 0.00		
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit)	g () Digital	Hours/Day Voice (Hours Other:	/Day): 0.00		
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit) 0 0.00	Downlink com Downlink Fre	mand rate: 0 quency (MHz): 0.00		
HERMAL (X) Active () Passive					
Heat Rejection, w Op	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	0 Haximum 8 Haximum 0 Maximum	8		:
COUIPMENT PHYSICAL CHARACTERIST Location Internal	TICS , , , , ,				
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0	() Remote () Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg: n: 0.00E+00 ma	Stowed Deployed x: 0.00E+00		ORIGINAL OF POOR
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0	() Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed		ORIGINAL PAG
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration REU REOUIREMENTS	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0 ypes Sensitivity, (g) min	() Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0 ypes Sensitivity, (g) min	() Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 00	() Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized 00	() Unpressurized H, m: 0.00 H, m: 0.00 Return mass, kg:	Stowed Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: 0. L, m: 0. Lâunch mass, Consumable T Acceleration CREU REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pressurized 00	() Unpressurized H, m: 0.00 H, m: 0.00 Réturn mass, kg: n: 0.00E+00 ma	Stowed Deployed	0.00 0.00 0.00	ORIGINAL PAGE IS

SPECIAL CONSIDERATIONS/See Instructions
THIS TON WAS BEEN INTEGRATED INTO BACK2064.

		P	oeing-Specific I	nput Data			
MISSION TYPE Free Flyer		OPS CODE					
() Not Serviced () Remote TMS () Remote Hanned () Serviced at Statio () Serviced at Statio	on (TMS Retrieve on (Self-propell	F FT FM 1) FST ed) FS					
Platform Based () Not Serviced () Remote THS () Remote Manned () Serviced at Static () Serviced at Static	on (TMS Retrieve on (Self-propell	P PT PM PST ed) PS					
Other Space Station Base Sortie	ed	SS SOR					•
CONSTRUCTION/SERVICING CO	ONPLEXITY						ORIGIN OF PO
Operations Times OTV Up/Down OTV or TMS on Orbit Mission Use IVA Service EVA Service Experiment Ops Service Frequency	man-c	/year lays/year lays/year lays/year s/year					ORIGINAL PAGE IS
Delta Velocities Up Down Aero Return	8:88						
Support Equipment Length: Length:	8.00 meters meters	Width:	0.00 meters 0.00 meters	Height: Height:	8:00 meters 0:00 meters	(Stowed) (Deployed)	
llass:	0 kg						
Manifest Restrictions (X) No Restrictions () Only with compatible () Fly-Alone () Must have Docking	ble payloads Nodule						
Length of Bean Fab Number of Appendages Number of Nodules Require	ed to Assemble tl	ne Payload	0.00				

*** ***

PAYLOAD ELEHERT NAME CODE FLUID MANAGEMENT TECHNOLOGY BACK2017	TYPE Science and Applications (Non-comm.)
CONTACT Haue T.L. LABUS Address NASA-LEWIS RESEARCH CTR	(X) Technology Development (A) Operations (B) Other (B) National Security (C) National Security (C) Type number (see table A) 16
Telephone 216/433-4000 X29	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned () Candidate	10 = Vital (X) Opportunity Scale = 6
Desired First Flight, Year 1992 Number of Flights	1 Duration of Flight, Days 0
OBJECTIVE TO PROVIDE A TECHNOLOGY BASE FOR SYSTEMS REQUIRING STORAGE, A AND TRANSFER OF EARTH STORABLES UNDER CONTROLLED REDUCED GRAVITATIONAL CONDITIONS.	CQUISITION
DESCRIPTION THE HISSIONS PROPOSED WILL PROVIDE THE TECHNOLOGY FOR THE LON SINGLE AND TWO-PHASE FLUIDS. KEY ISSUES REGARDING FLUID HECHA COMPLEX PHYSICAL SYSTMS NEED TO BE ADDRESSED. SPECIFIC EXPERI SCREEN ACQUISITION DEVICES, POOL BOILING, TWO-PHASE FLOW BOIL HOMERYOGENIC FLUIDS.	G TERM STORAGE, ACQUISITION AND TRANSFER OF BOTH INICS, HEAT TRANSFER AND THERMODYNAMICS OF THESE MENTS MUST BE CONDUCTED ON SURFACE TENSION ING, FLUID REORIENTATION AND TRANSFER UTILIZING
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Inclination, deg 0.0 Rodal Angle, deg Escape dv Required, m/s 0.0	Tolerance + 0 - 0 Tolerance + 0 - 0 Ephemeris Accuracy, m 0
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	() Earth (X) Any Field of View (deg) 0.00
POWER () AC () DC Power, W Duration, Hrs/Day	
Peak 0 0.00	O Continuous

ATA/COMMUNICATIONS Monitoring Requirements () None () Encription/Decripti () Uplink Required: () On-Board Data Proce Description:	time () Offline () Ot on Required Command Rate (KBS): 0	her: Frequency (Mlz): 0.00		
() On-Board Data Proce Description: Data Types: () A Film (Amount): Live TV (Hours/Day) On-Board Storage (I Data Dump Frequency Recording Rate (KBI	bit): 0:00 (Per Orbit) 0	Hours/Day Voice (Hours/D Other: Downlink comma Downlink Frequ	0.00 ay): 0.00 nd rate: 0		
HERIML (X) Active () Pass Temperature, deg C Heat Rejection, w	ive Operational Minimum Non-operational Minimum Operational Minimum Non-operational Minimum	0 Maximum 0 Maximum 0 Maximum 0 Maximum	0 0 0 0		
Equipment ID/Function L, n: L, n: Launch n Consumal	TERISTICS () External (X) Pressurized 7.00 W, m: 4.00 7.00 W, m: 4.00 nass, kg: 540 ble Types stion Sensitivity, (g)	H, m: 3.00 Return mass, kg:	Stowed Deployed 540 0.00E+00		ORIGINAL OF POOR
L, m: L, m: Launch n Consumal	7.00 (X) Pressurized W. m: 4.00 7.00 W. m: 4.00 W. m: 4.00 1.00 W. m: 4.00	() Unpressurized II, m: 3.00 II, m: 3.00 Réturn mass, kg:	Deployed		ORIGINAL PA
Equipment ID/Function L, m: L, m: Launch n Consumal Accelera	(X) Pressurized 7.00 V, m: 4.00 7.00 V, m: 4.00 ass, kg: 540 ble Types tion Sensitivity, (g) Task Assignments	() Unpressurized II, m: 3.00 II, m: 3.00 Réturn mass, kg:	Deployed		ORIGINAL PAGE OF POOR QUALI
Equipment ID/Function L, m: L, m: Launch n Consumal Accelera CREU REQUIREMENTS Crew Size 2	(X) Pressurized 7.00 W, m: 4.00 7.00 W, m: 4.00 ass, kg: 540 tle Types ttion Sensitivity, (g) Task Assignments	() Unpressurized H, m: 3.00 H, m: 3.00 Return mass, kg: min: 0.00E+00 max:	Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: L, m: Launch n Consumal Accelera CREU REQUIREMENTS Crew Size 2	(X) Pressurized 7.00 U, m: 4.00 7.00 U, m: 4.00 hass, kg: 540 he Types tion Sensitivity, (g) Task Assignments Skill 10	() Unpressurized H, m: 3.00 H, m: 3.00 Return mass, kg: min: 0.00E+00 max:	Deployed		ORIGINAL PAGE IS
Equipment ID/Function L, m: L, m: Launch n Consumal Accelera CREU REQUIREMENTS Crew Size 2	(X) Pressurized 7.00 U, m: 4.00 7.00 U, m: 4.00 hass, kg: 540 he Types tion Sensitivity, (g) Task Assignments Skill 10 Level 2	() Unpressurized H, m: 3.00 H, m: 3.00 Return mass, kg: min: 0.00E+00 max:	Degloyed 0.00E+00		ORIGINAL PAGE 19 OF POOR QUALITY
Equipment ID/Function L, m: L, m: Launch n Consumal Accelera CREU REQUIREMENTS Crew Size 2 Skills (See Table B)	(X) Pressurized 7.00	() Unpressurized H, m: 3.00 H, m: 3.00 Réturn mass, kg: min: 0.00E+00 max:	Degloyed 0.00E+00	0.00	OF POOR QUALITY

and the

PAYLOAD ELEMENT NAME TEST SGLAR-PUMPED LASERS CODE BACK2021	TYPE () Science and Applications (Non-comm.)
CONTACT Ilgue E.J. CONMAY Address LANGLEY RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 16
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Scale =1
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO DEMONSTRATE, CALIBRATE, AND TEST THE OPERATION OF A SOLAR-PUMPED LASER USING THE AM-O SOLAR SPECTRUM AND TO USE A LARGE, HIGH-QUALITY OPTICAL CONCENTRATOR DEPLOYED AND CHARACTERIZED AS AN EARLIER MISSION OBJECTIVE. TO PROVIDE A REALISTIC COMPARISON OF SEVERAL SOLAR LASER YPES.	
DESCRIPTION THE HISSION WILL DEMONSTRATE FOR THE FIRST TIME SOLAR-PUMPED LASING USING THE FULL SOLA (RATHER THAN A SHULLATED SPECTRUM). IT WILL PROVIDE FOR THE ACCURATE MEASUREMENT OF SOLUTICH IS SPECTRUM AND TEMPERATURE-DEPENDENT AND WILL PROVIDE FOR LONG-TERM OPERATION TO STABILITY AND LASANT RECONSTITUTION EFFICIENCY. SEE TECHNOLOGY DEVELOPMENT MISSION BACK2056	AR LASER EFFICIENCY
OkBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Inclination, deg 0.0 Ephemeris Accuracy, m	8
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) 0 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	.00
POWER (X) AC (X) DC Power, U Duration, Nrs/Day Operating Standby Operating Operating Standby Operating Op	

for expension of the last

DATA/COMMUNICATIONS Lionitoring Requirements: () None () Realtime () Encription/Decription Re () Uplink Required: Comman	ognirad		equency (1711)	2): 0.00			
() Uplink Required: Comman () On-Board Data Processing Description:	Required			0.00			
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbjt)	g () Digital	Vo	urs/Day ice (Hours/I her:				
On-Board Storage (Hbit) Data Dump Frequency (Per Recording Rate (KBPS)	: 0.00 r Orbit) 0 0.00		wnlink comma wnlink Frequ	and rate: mency (Mlz):	0.00		
HERMAL (X) Active () Passive							
Temperature, deg C Open Nor	n-operational Minimum	0	Maximum Maximum	0			
Heat Rejection, w Ope	erational Minimum	0	Maximum	0			
Non- COUTPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 0.6 L, m: 0.6 Launch mass,	TICS (X) External (X) Pressurized 00	H. m:	ressurized	Stowed Deployed			ORIC OF F
Notice of the second se	TICS () External (X) Pressurized 00	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg:				OF POOR
Non- EQUIPMENT PHYSICAL CUARACTERIS' Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable Ty Acceleration PREU REQUIREMENTS Crev Size 0	TICS () External (X) Pressurized 00 U, m: 0.00 00 U, m: 0.00 kg: 0 ypes Sensitivity, (g) Task Assignments	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg:	Deployed 0			ORIGINAL PA
Notice of the second se	n-operational Minimum TICS () External (X) Pressurized 00	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg:	Deployed 0			ORIGINAL PAGE OF POOR QUALI
Non EQUIPMENT PHYSICAL CUARACTERIS' Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	n-operational Minimum TICS () External (X) Pressurized 00	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg:	Deployed 0	 		ORIGINAL PAGE IS
EQUIPMENT PHYSICAL CUARACTERIS' Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	TICS (X) External (X) Pressurized (X) Pressur	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg: +00 max	Deployed : 0.00E+00			OF POOR QUALITY
EQUIPMENT PHYSICAL CHARACTERIS: Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable Tacceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B) EVA () Yes (X) No	n-operational Minimum TICS () External (X) Pressurized 00	() Unp II, m: II, m: Return	ote ressurized 0.00 0.00 mass, kg:	Deployed : 0.00E+00			ORIGINAL PAGE IS
Non EQUIPMENT PHYSICAL CUARACTERIS' Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	TICS (X) External (X) Pressurized (X) Pressur	() Unp H, m: H, m: Return min: 0.00E	ote ressurized 0.00 0.00 mass, kg: +00 max	Deployed : 0.00E+00		0.00	ORIGINAL PAGE 19

		1	Boeing-Specific I	nput Data			
Free Flyer () Hot Serviced () Remote THS () Remote Hanned () Serviced at Stati () Serviced at Stati	ion (TMS Retrieve	OPS CODE F FT FII ed) FST ed) FS					
Platform Based () Not Serviced () Remote THS () Remote Hanned () Serviced at Stati () Serviced at Stati	ion (TMS Retrieve ion (Self-propell	P PT PM PST Led) PS					
Other Space Station Bas Sortie	sed	SS					•
CONSTRUCTION/SERVICING (COMPLEXITY						OF POO
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	man- man-	days/year days/year days/year days/year es/year			. 1		OF POOR QUALITY
Delta Velocities Up Down Aero Return	0.00 0.00 0.00						
Support Equipment Length: Length:	0.00 meters 0.00 meters	Width:	0.00 meters 0.00 meters	Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	
Mass:	0 kg						
Hanifest Restrictions (%) No Restrictions () Only with compati () Fly-Alone () Hust have Docking	ible payloads g Nodule						
Length of Beam Fab Humber of Appendages Humber of Modules Requir	red to Assemble t	he Payload	0.00				

PAYLOAD ELEMENT HAME CODE LASER-TO-ELECTRIC ENERGY CONVERS BACX2022	TYPE () Science and Applications (Non-comm.) () Commercial
CONTACT E.J. CORMAY Hame HASA-LANGLEY RESEARCH CENTER Address	(X) Technology Development () Operations () Other () National Security Type number (see table A) 11
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	l = Low Value, But Could Use 10 = Vital Scale = 1
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO CHARACTERIZE AND COMPARE FOR SPACE OPERATION THE PERFORMANCE OF LASER TO-ELECTRIC POWER CONVERTERS, AND TO DEMONSTRATE SHORT-RANGE LASER- POWER TRANSMISSION IN SPACE.	
DESCRIPTION USTIC A SOLAR-PUMPED LASER DEPLOYED AND CHARACTERIZED UNDER AN EARLIER MISSION OBJECTIVE BACK 2056), TRANSHISSION OVER THE LONGEST SPACECRAFT DIMENSION WILL BE PERFORMED AND THE ATTERN AT THE CONVERTER SITE MEASURED. AN ASSESSMENT OF CONVERTER PERFORMANCE, EFFICIENT OF LONG-TERM OPERATION AND RESISTANCE TO ENVIRONMENTAL INTERFERENCE OR DEGRADATION WILL OR A SET OF CONVERTORS. SEE TECHNOLOGY DEVELOPMENT MISSION EACX 2056.	E INTENSITY ICY, STABILITY L BE PERFORMED OR POOR
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Nodal Angle, deg 0 Escape dV Required, m/s 0.0	PARE IS QUALITY
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	0.00
POWER (X) AC (X) DC Power, W Duration, Hrs/Day	
Operating 0 0.00 (X) Continuous Peak 0 0.00	

(*)

Voltage, V 0	Frequency, Hz	0	
DATA/COMMUNICATIONS Nonitoring Requirements: () None () Realtime () Encription/Decription Req () Uplink Required: Command () On-Board Data Processing	() Offline () Other: uired Rate (KBS): 0 Required	Frequency (tHz): 0.00	
Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital 0.00 0.00 0.00	Hours/Day 0.00 Voice (Hours/Day): 0.00 Other:	
Data Dump Frequency (Per Recording Rate (KBPS)		Downlink command rate: Downlink Frequency (EHz): 0.	.00
Heat Rejection, w Oper	rational Minimum (operational Minimum (rational Minimum (operational Minimum (Maximum 0 Maximum 0 Maximum 0 Maximum 0	
EQUIPMENT PHYSICAL CHARACTERISTI Location () Internal Equipment ID/Function L, m: 0.00 L, m: 0.00 Launch mass, k Consumable Typ Acceleration	() External (X) Pressurized (X) m: 0:00 (X) m: 0:00 (X) m: 0:00 (X) m: 0:00	() Remote () Unpressurized H, m: 0.00 Stowed H, m: 0.00 Deployed Return mass, kg: 0	ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size 0	Task Assignments		QUALITY
Skills (See Table E)	Skill	i i i i i i i i i i i i i i i i i i i	T
	Level	1 1 1 1	1
	Hours/Day	1 1 1 1	1
EVA () Yes (X) No	Reason	Hours/EVA 0.00	
SERVICING/NAINTENANCE Service:	Interval, days Returnables, kg	0 Consumables, kg	0

SPECIAL CONSIDERATIONS/See Instructions THIS HISSION INTEGRATED WITH BACK2021.

PAYLOAD ELEMENT HAME CODE SOLAR-SUSTATHED PLASHAS BACK2023	TYPE {
COUTACT Name E.J. CONMAY Address LANGLEY CONTACT	(X) Technology Development () Operations () Other () National Security Type number (see table A) 11
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 1
Desired First Flight, Year: 1996 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO DEMONSTRATE, CONTAIN, AND CHARACTERIZE SOLAR-SUSTAINED PLASMAS AND TO OPERATE, ASSESS, AND REFINE MID ELECTRIC POWER GENERATION IN SPACE AND PLASMA THRUSTER PERFORMANCE.	
REFER TO TD HO. 2056	
DESCRIPTION CONCENTRATED SUBLIGHT WILL EXCITE A PLASMA. CHARACTERISTICS OF THE PLASMA AND ITS CONTA BE ASSESSED IN TERMS OF THEORETICAL PERFORMANCE AND PRIOR TERRESTRIAL TESTS. AFTER SUIT UNDERSTANDING HAVE BEEN ACHIEVED, THE PLASMA WILL BE USED IN MID ELECTRICAL GENERATING THEIR SPACE FEASIBILITY AND OPERATING CONSTRAINTS. THE PLASMA WILL ALSO BE ASSESSED AS HEDIUM FOR THERMAL PLASMA THRUSTERS AND FOR MPD THRUSTERS.	ABLE CONTROL AND SYSTEMS TO IDENTIFY THE EXHAUST POON ON
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Ilodal Angle, deg Escape dv Required, m/s 0.0	O O O O O O O O O O O O O O O O O O O
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) FOUNTING/ORIENTATION (X) Any Field of View (deg) 0	.00
POUER (X) AC (X) DC Pover, U Duration, Hrs/Day	
Operating 0 0.00 Standby 0 0.06 (X) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

ERVICIES/MAINTENANCE Service:	Interval, days Returnables, kg		Co Na	nsumables, n hours	kg	0.00	
EVA (X) Yes (X) No	Reason SOLAR CONCER	TRATOR	llours/EVA	0.00			
	Hours/Day 4	1 1	1 1	1			
	Level 3	l I	1 1	ī	ī		QUALITY
Skills (See Table B)	Skill 3	1 1	1 1	l'	Ī		AGE
REW REQUIREMENTS Crew Size 1	Task Assignments						, U [
QUIPMENT PHYSICAL CHARACTERISTI Location () Internal Equipment ID/Function L, m: 6.00 L, m: 6.00 Launch mass, k Consumable Typ Acceleration S	(X) Pressurized V, m: 2.00 V, m: 2.00 V, g: 2.00	II, m: II, m: Return :	1.00 Dep	wed loyed .00E+00			OF POOR
(X) Active () Passive Temperature, deg C Oper	rational Minimum operational Minimum rational Minimum operational Minimum	8	Maximum Maximum Maximum Maximum	0. 0. 0			÷
Data Dump Frequency (Per Recording Rate (KBPS)	0rbit) 0 0.00		mlink conmand mlink Frequenc		0.00		
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital 0 8:88	Vo	irs/Day ice (llours/Day) ier:	0.00 0.00			
() Uplink Required: Command On-Board Data Processing Description:	Rate (KBS): 0 Required	Fr	equency (1Hz):	0.00			
ATA/COMMUNICATIONS Lionitoring Requirements: () None () Realtime () Encription/Decription Req	uired	ther:					

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DATE	7-MAR	-83
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TIME 18:55 (283010) FILENAME: REIDE.BAT

SOLAR SUSTAINED PLASMAS

PROTOTYPE QUANTITY	3.000		WEISHT VOLUME	320.00 324.06	MODE QUANTITY/NHA	1
PROGRAM COST(\$ 1000)	DEVELO	DMCNT	eco	DUČTION	TOTAL COST	
	DEVELO	HEN	, AL	DOCTION	TOTAL COST	
ENGINEERING						
DENFTING	34	61.		-	361.	
DESIGN	120	57.			1267.	
SYSTEMS	3	02.		-	302.	
PROJECT MGMT	ói	39.		-	689.	
DATA		76.		-	76.	
SUBTOTAL (ENG)		96.		-	2696.	
MANUFACTURING						
PRODUCTION		-			-	
PROTOTYPE	170	05.			1705.	
TOOL-TEST EQ		ló.			1116.	
SUBTOTAL (MFG)	283			-	2821.	
TOTAL COST	551	17.		-	5517.	

ELECTRONIC ITEM

. BUSTAINED FLASHAS

Sale 4-MaR of

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AUGAAN CSST: 9 1000	1) 55	VELOFMENT	F#35.	ertten	TOTAL S	DAT
ENGINEER LING	.,	VELOFIEM				
LRAFTING		361.		-	351	
188101		1247.			12.57	
1/8/2/18		302.			30:	
FOUNDATION TO SECOND		669.				
enta					2695	
SUBTOTAL (E)	NG)	2696.			-071	•
MANUFACTURING						
PRODUCTION						
PROTOTYPE		1705.			1703	
TOOL-TEST EQ		1116.		*	1112	
SUBTOTAL (MI	FG)	2821.			- 232:	
TOTAL COST		5317.			7517	
Dedion FACTORS	ELECTRONIC	HECHANICA	AL FROLU	or peachi	170% a	
deidn)	10.000*	210.000	ENG	INEERING	COMPLEASTY	1.000
.ENSITY	42.300	0.6481		TOTYPE BU	FFGRI	1.0
HES. COMPLEXITY	10.357	7.300	FRO	TO SCHEDU	.E FACTOR .	.2504
HEW DESIGN	0.100	0.500	ELE	CT VOL PA	ACTION	.0014
LAGION REPEAT	0.000	0.000		FEDRA		2.330
EGGIFMENT CLASS		*****		A DE TELH	redu. De i	19878
INTEGRATION LEVEL		0.0	REL	IABILITY	FACTOR	:.0
			MIB	(FIELD)		02101+
	START		TIAST ITEM		F119.0	
LEVELOPMENT			Eb sa.		10v 99*	. 23.
12VELDF NEN I	JAN 07					
SUFFLENENTAL INFOR						
ISAN OF ECONOMIC		64			EAL FACTORS	
ESCALATION		.00	DEVI	Luf it.	100-140	2.00
CEN TOST MULTIPL	IER 1.	.14				
. ET NANGES	DEV	ELOPHENT	FROLU	2113/1	IGIAL CO	187
FROM		4814.			+315	
SENTER		5517.			1517	
70		6333.			2333.	
14		9999.			,,,,,	

PAYLOAD ELEMENT MADE LASER COUNT & TRACKING DEVELOP EX BACK2025 CONTACT Name JAMES E. RANDOLPH M/S 156-220 Address JPL - 4800 OAK GROVE DR. PASADENA, CA 91109	TYPE () Science and Applications (Non-comm.) () Commercial () Technology Development () Operations () Other () National Security
Telephone 213/354-2732 STATUS () Operational () Approved () Planned () Candidate (X) Opportunit	Type number (see table A) 12 Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
Desired First Flight, Year: Number of Flights	
OBJECTIVE TO PROVIDE THE TECHNOLOGY BASE FOR THE DEVELOPMENT OF MEDIUM-RANGE (<10 KH), LOW POWER (<100 km) SOLID STATE LASER COMMUNICATION LINKS USING SPACE BASED LASER OPTICAL TECHNOLOGY. IN ADDITION, THE EXPERIMENT WOULD ENABLE THE DEVELOPMENT AND TESTING OF A VLSI SUPERWAFER LASER ARRAY.	
DESCRIPTION THE EXPERIMENT WOULD UTILIZE "NODE" ASSEMBLIES CONTAINING LASER SUPERVAFERS. VARIOUS SPACE STATION APPENDAGES AND TELEOPERATOR. TESTS OF THE COMMUNICATION AND A TELEOPERATOR FOR VARIOUS ALTITUDES AND RANGES WOULD INCLUDE ACQUISITION HEAD A TELEOPERATOR FOR VARIOUS ALTITUDES AND RANGES WOULD VERIFY THAT SPHEMENTS OF BIT ERROR PERFORMANCE. THE EXPERIMENTS WOULD VERIFY THAT SPHEMENTS POSSIBLE AROUND THE SPACE STATION. THE EXPERIMENTS WOULD REQUIRE ADAPTIVE	N LICK BETVEEN THE SPACE STATION N AND TRACKING TESTS ALONG WITH ERICAL COMMUNICATIONS COVERAGE EXPERIMENTAL HODE PLACEMENT.
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance Inclination, deg 28.5 Hodal Angle, deg Escape dV Required, m/s	+ - 20
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance) () Inertial () Solar () Earth Field of View	(X) Any
POWER () AC (X) DC Power, U Duration, Hrs/Day Operating 100 8.00 Standby Peak Voltage, V Frequency, Hz	

() Lucarberon/ Decraption Re	() Offline () Other: equired ad Eate (KBS):	Frequency (lalz):	
() Uplink Required: Comman (X) On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital	Hours/Day Voice (Hours/Day): Other:	
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit)	Downlink command rate: Downlink Frequency (IMz):	
THERMAL () Active (X) Passive Temperature, deg C Open Non Heat Rejection, w Open Non	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	Maximum Haximum Haximum Maximum	
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 1.0 L, m: 1.0 Launch mass, Consumable Ty Acceleration	(X) External () Pressurized 00	() Remote (X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	O OR
EQUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 1.0 L, m: 1.0 Launch mass, Consumable Ty Acceleration CREM REQUIREMENTS Crey Size	(X) External () Pressurized () Pressurized () O U, m: 1.00 () D External () Pressurized () O U, m: 1.00 () Kg: 1.00	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Réturn mass, kg:	ORIGIN OF POC
CREAL REQUIREMENTS	Sensitivity, (g) min:	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Réturn mass, kg:	POOR
CREW REQUIREMENTS Crew Size	Task Assignments	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Réturn mass, kg:	POOR
CREW REQUIREMENTS Crew Size	Task Assignments Skill 8 Level 3	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	POOR
CREW REQUIREMENTS Crew Size	Task Assignments	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS
CREW REQUIREMENTS Crew Size Skills (See Table B)	Task Assignments Skill 8 Level 3 Hours/Day Reason Interval, days Returnables, kg	(X) Unpressurized H, m: 1.00 Stowed H, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	POOR

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Boeing-Specific Input Data
IIISSIOH TYPE
Free Flyer
( ) Hot Serviced
( ) Remote THS
( ) Remote Hanned
                                                                  OPS CODE
                                                                       F
FT
FM
          Serviced at Station (TIS Retrieved)
                                                                       FST
     ( ) Serviced at Station (Self-propelled)
                                                                       FS
     Platform Based
       ) Not Serviced
                                                                      PT
          Remote TMS
          Remote Hanned
Serviced at Station (TMS Retrieved)
Serviced at Station (Self-propelled)
                                                                       PM
PST
                                                                       PS
     Other
(%) Space Station Based
( ) Sortie
                                                                       SS
CONSTRUCTION/SERVICING COMPLEXITY
                                                                                                                                                                        OF POOR QUALITY
          Low
          Medium
     ( ) High
Operations Times
OTV Up/Down
                                                     days
                                                    days
days/year
man-days/year
man-days/year
    OTV or THS on Orbit
Mission Use
IVA Service
EVA Service
                                               50 man-days/year
times/year
    Experiment Ops
    Service Frequency
Delta Velocities
    Up
    Down
Aero Return
Support Equipment
                   Length:
Length:
                                                                                                                                                      (Stowed)
(Deployed)
                                            meters
                                                                                       meters
                                                                                                                                     meters
                                            meters
                                                                                       meters
                                                                                                                                     meters
                   liass:
                                            kg
Manifest Restrictions
    (X) No Restrictions
         Only with compatible payloads
Fly-Alone
Bust have Docking Module
Length of Bean Fab
Humber of Appendages
Humber of Hodules Required to Assemble the Payload
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PAYLOAD ELEMENT MAINE LULTI-FREQ MIGH GATH ANTEHNA CODE BACX2026	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Name JAMES E. RANDOLPH M/S 156-220 Address JPL, 4800 OAK GROVE DR PASADENA, CA 91109	(X) Technology Development () Operations () Other () National Security Type number (see table A) 10
Telephone 213/354-2732	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 8
Desired First Flight, Year: 1996 Number of Flights	Duration of Flight, Days
TO DEVELOP THE TECHNOLOGY BASE FOR DUAL FREQUENCY HIGH GAIN MULTI-FREQUENCY ANTENNAS	
THE EXPERIMENT WILL CONSIST OF A MULTI-FREQUENCY ANTENNA WITH MECHANICAL APERA ELECTRONIC STEERING OF THE COMPOSITE BEAM TO COMPENSATE FOR FINE ERRORS OF APE OF THE SPACE STATION. THE EXPERIMENT WILL DEMONSTRATE COMPOSITE PATTERN CONTRO COMMUNICATION WITH SPACECRAFT IN SYNCHROHOUS ORBITS. COMMUNICATIONS LINKS WILL OPTIONS WILL BE STUDIED, AND OPTIMUM COMBINATIONS WILL BE IDENTIFIED. FREQUENC SCREEKS, MULTI-FREQUENCY ANTENNAS WITH MECHANICAL APERATURE STEERING AND ELECT WILL BE DEVELOPED. AN ENGINEERING MODEL OF THE MULTI-FREQUENCY ANTENNA WILL BE	CRATURE HOTION AND HOVEMENT OL AND STABILITY WHEN L BE INVESTIGATED, FREQUENCY OY SELECTIVE REFLECTORS, DICHRO CRONIC PATTERN STABILIZATION OF TESTED IN SPACE.
Inclination, deg 28.5 Hodal Angle, deg Ephemeris Accur	PAGI
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth Truth Sites (if known) Pointing Accuracy, arc-sec Pointing Stability (Jitter), arc-sec/sec Special Restrictions (Avoidance)	(K) Any
POWER () AC (X) DC Power, W Duration, Mrs/Day	
Operating 1000 12.00 Standby (X) Continuous Peak Voltage, V Frequency, Hz	

ATA/COMMUNICATIONS Louitoring Requirements: None None Encription/Decription R Uplink Required: Comma X On-Board Data Processin Description:	e () Offline () Other: equired and Rate (KBS): as Required	Frequency (tMz):	
Description: Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Mbit)	E (A) DIELLAL	Nours/Day Voice (Hours/Day): 0.00 Other:	
Data Dump Frequency (Pe Recording Rate (KBPS)	r Orbit)	Downlink command rate: Downlink Frequency (MHz):	
MERNAL () Active (X) Passive Temperature, deg C Op No Heat Rejection, w Op	perational Minimum nn-operational Minimum perational Minimum nn-operational Minimum	Maximum Maximum Maximum Maximum	
CQUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 1. L, m: 3. Launch mass, Consumable T	TICS (X) External (Pressurized) 00	() Remote (X) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINA OF POO
CQUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 1. L, m: 3. Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size	(X) External (Pressurized 00 U, m: 1.00 00 W, m: 3.00 kg: 3.00	(x) Remote (x) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg:	ORIGINAL PA
REW REQUIREMENTS	(X) External (Pressurized 00 W, m: 1.00 00 kg: 100 cypes Sensitivity, (g) min:	(x) Remote (x) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE OF POOR QUALI
CREW REQUIREMENTS Crew Size	(X) External (Pressurized 00 U, m: 1.00 00 W, m: 3.00 kg: 100 ypes Sensitivity, (g) min: Task Assignments	(x) Remote (x) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS
CREW REQUIREMENTS Crew Size	(X) External (Pressurized 00 W, m: 1.00 00 W, m: 3.00 kg: 100 ypes Sensitivity, (g) min: Task Assignments Skill 11 1 1 1 1 1 1 1 1	(x) Remote (x) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS
CREW REQUIREMENTS Crew Size	TICS (X) External () Pressurized 00	(x) Remote (x) Unpressurized II, m: 1.00 Stowed II, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00	ORIGINAL PAGE IS
CREW REQUIREMENTS Crew Size Skills (See Table B)	TICS (X) External () Pressurized 00	(x) Remote (x) Unpressurized II, m: 1.00 Stowed III, m: 1.00 Deployed Return mass, kg: 0.00E+00 max: 0.00E+00 12 13 7 8 1 3 3 3 1 1 1 1 1 Hours/EVA 8.00 Consumables, kg	ORIGINAL PAGE IS

SPECIAL CONSIDERATIONS/See Instructions

		Boe	ing-Specific I	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote TNS () Remote Manned () Serviced at Station () Serviced at Station	(THS Retrieved (Self-propelle	OPS CODE F FT FH FH ed) FST					
Platform Based () Not Serviced () Remote TNS () Remote Nammed () Serviced at Station ()	(TMS Retrieved (Self-propello	P PT PH PST ed) PS					
Other (X) Space Station Based Sortie		SS SOR					
CONSTRUCTION/SERVICING COMPI	LEXITY						
Operations Times OTV Up/Down OTV or THS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	man-d	year ays/year ays/year ays/year ays/year					OF POOR QUALITY
Delta Velocities Up Dovm Aero Return							ALIA E E
Support Equipment Length: Length:	meters meters	Width: Width:	meters meters	Height: Height:	meters meters	(Stowed) (Deployed)	
liass:	kg						
Manifest Restrictions (X) No Restrictions () Only with compatible () Fly-Alone () Must have Docking Mod	payloads dule						
Length of Beam Fab Number of Appendages Number of Lodules Required t		ne Payload	3				

.0

PAYLOAD CLEIGHT HAME LASER PROPULSION TEST CONTACT Hame E.J. COMMAY Address HASA-LANGLEY RESEARCH CENTER	TYPE () Science and Applications (Non-comm.) () Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 13
Telephone STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Importance of the Space Station to this Element - 1 = Low Value, But Could Use 10 = Vital Scale = 5
Desired First Flight, Year: Number of Flights Duration	
TO HEASURE THE THRUST AND SPECIFIC IMPULSE OF ONE OR MORE LASER PROPULSION SYSTEMS, AND TO ASSESS THE ADEQUACY OF GROUND-BASED HEASUREMENTS, AND TO TEST THE LIFE EXPECTANCY OF A LASER ENGINE.	· 유유
DESCRIPTION THE MISSION WILL BE THE FIRST SYSTEMS-LEVEL TEST OF LASER PROPULSION IN SPACE. IT WIS SPECIFIC IMPULSE AS WELL AS SYSTEM CHARACTERISTICS SUCH AS STEADY-STATE WALL TEMPERAY MASS FLOW RATE. A HIGH-POWER LASER, EITHER SOLAR-PUMPED OR ELECTRICALLY PUMPED, WILL MISSION. LIFE TESTS WILL BE PERFORMED. SEE TECHNOLOGY DEVELOPMENT MISSION BACK2056.	OF PORIGINAL TURE, PROPELLANT BE REQUIRED FOR THIS ORIGINAL ORIGI
ORBIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) No Apogee, km 0 Tolerance + 0 Inclination, deg 0.0 Tolerance + 0 Hodal Angle, deg 0 Escape dv Required, m/s 0.0 Ephemeris Accuracy, m	- ° 8
POLITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POWER (X) AC (X) DC Power, W Duration, Wrs/Day Operating Standby Operating Operating Standby Operating Op	

ATA/COMBUNICATIONS Lionitoring Requirements: () None () Realtime () Encription/Decription () Uplink Required: Comma () On-Board Data Processing Description:	nnd Rate (KBS): 0 ng Required	Frequency (1312	2): 0.00		
Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit)	og () Digital	Hours/Day Voice (Hours/D Other:	0.00 0ay): \ 0.00		
Data Dump Frequency (Pe Recording Rate (KBPS)	0.00 0.00	Downlink comma Downlink Frequ			
No	perational Minimum 0 on-operational Minimum 0 perational Minimum 0	Maximum Maximum	0		
OUIPHENT PHYSICAL CHARACTERIS	on-operational Minimum 0 CTICS () External	() Remote	0		
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable I Acceleration	On-operational Minimum 0 OTICS (X) External (X) Pressurized OO W, m: 0.00 (No	Remote Remote Color Unpressurized Microscopic Color Microscopic Color	Stowed Deployed : 0.00E+00		ORIGINAL OF POOR
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable 1 Acceleration CREM REQUIREMENTS Crev Size 0	On-operational Minimum 0 OTICS () External (X) Pressurized OO W, m: 0.00 OO, m: 0.00 kg: 0 Sensitivity, (g) min: Task Assignments	Remote Remote Color Col	Stowed Deployed		OF POOR QU
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable I Acceleration	On-operational Minimum 0 CTICS (Remote Remote Color Col	Stowed Deployed		ORIGINAL PAGE OF POOR QUAL
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable 1 Acceleration CREM REQUIREMENTS Crev Size 0	On-operational Minimum 0 OTICS () External (X) Pressurized OO W, m: 0.00 OO, m: 0.00 kg: 0 Sensitivity, (g) min: Task Assignments	Remote Remote Color Col	Stowed Deployed		ORIGINAL PAGE IS
QUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable 1 Acceleration REW REQUIREMENTS Crev Size 0 Skills (See Table B)	On-operational Minimum 0 CTICS (Remote Remote Color Col	Stowed Deployed		ORIGINAL PAGE IS
QUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable 1 Acceleration CREM REQUIREMENTS Crew Size 0	Carrel	Remote Remote Color Col	Stowed Deployed 0.00E+00		ORIGINAL PAGE IS
QUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function L, m: 0. L, m: 0. Launch mass, Consumable 1 Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	Still	() Remote () Unpressurized II, m: 0.00 III, m: 0.00 Return mass, kg: 0.00E+00 max:	Stowed Deployed 0.00E+00	0.00	OF POOR QUALITY

		I	Boeing-Specific I	nput Data			
HISSION TYPE Free Flyer () Not Serviced () Remote TMS () Remote Named () Serviced at Static () Serviced at Static	on (THS Retrieve	OPS CODE F FT FII T FST					
Platform Based () Not Serviced () Remote THS () Remote Manned () Serviced at Static () Serviced at Static	on (THS Retrieve on (Self-propell	P PT PH d) PST ed) PS					
Other Space Station Base Sortie	ed	SS SOR					
CONSTRUCTION/SERVICING CO	MPLEXITY						ORIGINA OF POO
Operations Times OTV Up/Down OTV or ThS on Orbit Hission Use IVA Service EVA Service Experiment Ops Service Frequency	man-						OF POOR QUALITY
	0.00 8:88						
Support Equipment Length: Leugth:	0.00 meters 0.00 meters	Width: Width:	0.00 meters 0.00 meters	Height: Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	
Mass:	0 kg						
Manifest Restrictions (X) No Restrictions () Only with compatib () Fly-Alone () Must have Docking	le payloads Hodule						
Length of Beam Fab Number of Appendages Number of Hodules Require	d to Assemble th	ho Paylord	0.00				

PAYLOAD ELEMENT MAKE LAMIPULATOR CONTROLS TECH CONTACT Make JACK PENHINGTON/A.J. MEINTEL Address MASA-LANGLEY RESEARCH CENTER	TYPE {
Telephone STATUS () Operational () Approved () Planned () Candidat	10 = Vital
Desired First Flight, Year: Number of Flights	Duration of Flight, Days
OBJECTIVE 1) DETERMINE THE CHARACTERISTICS AND LIMITATIONS OF INTERACT ADAPTIVE CONTROL TECHNOLOGY APPLIED TO SPACE TELEOPERATOR SY 2) TO DEVELOP A QUANTITATIVE DATA BASE WITH WHICH TO COMPARE TASK PERFORMANCE WITH TELEOPERATION AND IN A SPACE SUIT.	TVE AND STEMS.
DESCRIPTION A LIGHTWEIGHT LOW-INERTIAL DUAL-ARM MANIPULATOR SYSTEM WILL STRUCTURE. THE MANIPULATOR SYSTEM WILL BE CONTROLLED FROM A STATION, THROUGH A COMPUTER INTERFACE, USING BOTH SUPERVISOR MANIPULATOR SYSTEM WILL BE IN A SPACE STATION LABORATORY. TE OF SYSTEM RESPONSE-TO VALIDATE GROUND BASED MODELS, TO IDENT CONTROL ALGORITHMS FOR ZERO-G OPERATIONS. EXPERIMENTS WILL P MOBILITY, AND RESPONSE TO BILATERAL FORCES. BASELINE TESTS W USING THE TELEOPERATOR WITH PERFORMANCE IN A SPACE SWIT. IN TELEOPERATOR SYSTEM WILL BE ATTACHED TO A CARRIER VEHICLE SW	TELEOPERATOR CONTROL STATION IN THE SPACE LY AND DIRECT CONTROL MODES. INITIALLY, THE LSTS WITHIN THE LABORATORY WILL INCLUDE EVALUATIO LIFY SYSTEM PARAMETERS, AND TO DEVELOP ADAPTIVE ROVIDE DATA ON OPERATOR RESTRAINTS, WORKLOAD, LILL BE CONDUCTED TO COMPARE TASK PERFORMANCE ADDITION TO TESTS WITHIN THE SPACE STATION THE
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km 0 Inclination, deg 0.0 Rodal Angle, deg Escape dv Required, m/s 0.0	0.0
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POWER (X) AC (X) DC Power, U Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00 Peak Voltage, V OFFICIAL OFFICIA	(X) Continuous

Louitoring Requirements: () Rone () Realtime () Encription/Decription Ro () Uplink Required: Comman () On-Board Data Processing Description:	() Offline () Other equired nd Rate (KBS): 0 Required	Frequency (191	z): 0.00	
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital	Hours/Day Voice (Hours/ Other:	0.00 Day): 0.00	
Data Dump Frequency (Per Recording Rate (KBPS)	Orbit) 0 0.00	Downlink comm Downlink Freq		
MERIAL (X) Active () Passive				
Temperature, deg C Ope Nor Heat Rejection, w Ope Nor	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	0 Haximum 8 Maximum 8 Haximum 0 Haximum	8	
CHITDIAN OF THE PARTY OF THE PARTY OF THE	1700			
Equipment ID/Function L, m: 0.0 L, m: 0.0 L, m: 0.0 Consumable Ty	(X) Pressurized 00 W, m: 0.00 00 U, m: 0.00 kg: 0	() Remote () Unpressurized II, m: 0.00 II, m: 0.00 Return mass, kg: in: 0.00E+00 max	Stowed Deployed : 0.00E+00	ORIGINAL OF POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration	(X) Pressurized (X) W, m: 0.00 (X) W, m: 0.00 (X) W, m: 0.00 (X) Pressurized	() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg:	Deplgyed	ORIGINAL PAG OF POOR QUA
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS	(X) Pressurized 00 W, m: 0.00 00 W, m: 0.00 kg: 0 vpes Sensitivity, (g) m	() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg:	Deplgyed	ORIGINAL PAGE I
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Pressurized (X) W, m: 0.00 (X) W, m: 0.00 (X) W, m: 0.00 (X) Pressurized (X) Press	() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg:	Deplgyed	ORIGINAL PAGE IS
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Pressurized (X) W, m: 0.00 (X) Pressurized (X) Pre	() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg:	Deplgyed	ORIGINAL PAGE IS OF POOR QUALITY
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (X) Pressurized (X) W, m: 0.00 (X) W, m: 0.00 (X) W, m: 0.00 (X) Pressurized (() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg:	Dep18yed : 0.00E+00	ORIGINAL PAGE IS
L, m: 0.0 Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pressurized (X) W, m: 0.00 (X) W, m: 0.00 (X) W, m: 0.00 (X) Pressurized (() Unpressurized II, m: 0.00 II, m: 0.00 Réturn mass, kg: in: 0.00E+00 max	Dep18yed : 0.00E+00	OF POOR QUALITY

Boeing-Specific Input Data MISSION TYPE Free Flyer OPS CODE Hot Serviced Remote THS Remote Hanned F FT FI. Serviced at Station (THS Retrieved) FST) Serviced at Station (Self-propelled) FS Platform Based Not Serviced P PT Remote THS Remote Harned Serviced at Station (TMS Retrieved) Serviced at Station (Self-propelled) PM PST Other Space Station Based Sortie SOR OF POOR QUALITY CONSTRUCTION/SERVICING COMPLEXITY Lou Hedima) High Operations Times OTV Up/Down days OTV or THS on Orbit days Hission Use IVA Service EVA Service days/year man-days/year man-days/year Experiment Ops man-days/year Service Frequency times/year Delta Velocities Up 0.00 Down Aero Return Support Equipment 8:00 meters 0.00 meters (Stowed) (Deployed) Length: Length: meters 0 kg llass: Manifest Restrictions (X) No Restrictions Only with compatible payloads Fly-Alone Bocking Module Length of Beam Fab Humber of Appendages Humber of Hodules Required to Assemble the Payload 0.00 ö

PAYLOAD ELEMENT NAME SATELLITE SERVICING TECHNOLOGY CODE BACK2031	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Hame WILLIAM WALES Address MARSHALL SPACE FLIGHT CE	(X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone	Importance of the Space Station to this Element 1 = Lov Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale =
Desired First Flight, Year: Number of Flights Duration	of Flight, Days
TO PROVIDE THE TECHNOLOGY REQUIRED TO SERVE FREE-FLYING SPACECRAFT/ SATELLITE AT AN ORBITAL SUPPORT FACILITY. THE SERVICING OF SATELLITES INCLUDES NOT ONLY PERIODIC SUPPORT BUT REPAIR AND CHECKOUT OF DEFECTIVE SATELLITE SYSTEMS. THE RETRIEVAL AND REDEPLOYMENT MAY BE A FUNCTION OF THE SPACE STATION; HOWEVER, IT IS NOT A PART OF THIS TECH DEVELOP MISSIO DESCRIPTION THE PROPOSED HISSION(S) ARE REQUIRED TO DEVELOP THAT TECHNOLOGY NEEDED FOR SERVICING SATA MANNIED FACILITY AND/OR REMOTELY FROM THE MANNIED FACILITY. THE ISSUES OF MAJOR CONCERNICIONALE REPLACEMENT AND CHECKOUT, GRAPPLE/ATTACHMENT TECHNIQUES, FLUID TRANSFER, REMOTE AND ORBITAL ASSEMBLY OF SATELLITES (LIMITED). THE TECHNOLOGY DEVELOPMENT MISSION(S) SENAION OF THOSE SATELLITE FUNCTIONS AND SERVICES REQUIRED FROM THE SUPPORT FACE	N ARE: SUBSYSTENS SERVICING/CHECKOUT, LECTED UILL REPRESENT CILITY. OR
ORBIT CHARACTERISTICS () Yes (X) No	PAGE 18
Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Endal Angle, deg Ephemeris Accuracy, m Escape dv Required, m/s 0.0	8 2 34
Apogee, km 0 Perigee, km 0 Tolerance + 0 - Inclination, deg 0.0 Tolerance + 0 - Eodal Angle, deg Escape dv Réquired, m/s 0.0 POINTINC/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known)	0.00

EVA () Yes (X) No ERVICING/NAINTENANCE Service:	Hours/Day Reason	<u> </u>		.00	!	 161
	Hours/Day	l I	1 1	. 1	!	
DELLIS (Dec laste b)	Level	1 1	1 1	1	1	
Skills (See Table E)	Skill	l I	1 1	l'	Ī	310
REM REQUIREMENTS Crew Size 0	Task Assignments					DALLY TOE IS
QUIPMENT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function L, m: 0.6 L, m: 0.6 Launch mass, Consumable Ty	(X) Pressurized 00 V, m: 0.00 00 W, m: 0.00 kg: 0	II, m: Return mass	.00 Stowe	yed		ORIGINAL PAG
Heat Rejection, w Ope	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	8	laximum laximum	}		
Live TV (Hours/Day): On-Board Storage (Hbit) Data Dump Frequency (Per Recording Rate (KBPS)	8:88 orbit) 0 0.00	Down1:	nk command ra		0.00	
() Uplink Required: Comman On-Board Data Processing Description: Data Types: () Analog Film (Amount):	0 Digital	llours, Voice Other:	(Hours/Day):	0.00		
() yii boota bata libecosing	nd Pate (KBS): 0	Freque	ncy (IIIz):	0.00		

```
Boeing-Specific Input Data
HISSION TYPE
Free Flyer
                                                              OPS CODE
    ( ) Not Serviced
Remote THS
Remote Hanned
         Serviced at Station (TMS Retrieved)
                                                                   FST
         Serviced at Station (Self-propelled)
                                                                  FS
    Platform Based
         llot Serviced
                                                                   PT
         Remote This
         Remote Hanned
Serviced at Station (THS Retrieved)
Serviced at Station (Self-propelled)
                                                                  PM
PST
   Other Space Station Based
                                                                  SS
                                                                                                                                                                  OF POOR QUALITY
CONSTRUCTION/SERVICING COMPLEXITY
         Low
         Medium
    ( ) High
Operations Times
    OTV Up/Down
                                                  days
    OTV or THS on Orbit
                                                  days
                                                 days/year
man-days/year
man-days/year
    Mission Use
IVA Service
    EVA Service
    Experiment Ops
Service Frequency
                                                  man-days/year
times/year
Delta Velocities
                                  0.00
    Up
    Down
Aero Return
Support Equipment
                                  0.00 meters
0.00 meters
                                                                           0.00 meters
0.00 meters
                                                                                                                      0.00 meters
0.00 meters
                                                                                                                                            (Stoved)
(Deployed)
                                                           Width:
                  Length:
Length:
                                      0 kg
                  Mass:
Manifest Restrictions
    (X) No Restrictions
         Only with compatible payloads
         Fly-Alone Bocking Hodule
Length of Beam Fab
Humber of Appendages
Humber of Hodules Required to Assemble the Payload
                                                                            0.00
```

PAYLOAD ELEBERT HAME CODE BACK2032	TYPE Science and Applications (Non-comma.)
CONTACT Name VILLIAM WALES Address NARSHALL SPACE FLIGHT CE	(X) Technology Development () Operations () Other () National Security Type number (see table A) 15
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Cand	10 = Vital
Desired First Flight, Year: 0 Number of Flight	ghts 0 Duration of Flight, Days 0
OBJECTIVE TO PROVIDE THE TECHNOLOGY REQUIRED TO MAINTAIN AN ORBITAL VEHICLE (OTV) ON-ORBIT BETWEEN FLIGHTS. EARLY IMPLIFIED IN THE OTV TECHNOLOGY EVOLUTION COULD BE PERFORMED IN GROOF FROM THE ORBITER, HOWEVER, THE MORE COMPLEX, LONGER DE EXPERIMENTS WILL REQUIRE THE SUPPORT OF THE SPACE STATION	OUND FACILITIES
DESCRIPTION THE PROPOSED MISSION(S) ARE REQUIRED TO DEVELOP THE TECH VEHICLE SYSTEM AND MAINTAINING IT FROM AN ORBIT BASE. THO GAUGING AND PRESERVATION OF THE OTV PROPELLANTS; THE MAIN COMPONENTS; THE SERVICING AND REPLACEMENT OF PROPULSION ERAKING OR AEROMANEUVERING SYSTEM; AND THE INTEGRATION AN OR MULTIPLE TYPE PAYLOADS; AND/OR A MANNED CREW TRANSFER	SE ISSUES OF MAJOR CONCERN ARE: THE REFUELING, INTENANCE, REPLACEMENT AND CHECKOUT OF AVIONICS SYSTEM COMPONENTS; INSTALLATION OF ANY AERODYNAMIC AND CHECKOUT OF THE OTV WITH ANOTHER STAGE, SINGLE
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km 0 Perigee, km (Inclination, deg 0.0 Hodal Angle, deg 0 Escape dV Required, m/s 0.0	O Tolerance + 0 - 0 Tolerance + 0 - 0 Tolerance + 0 - 0 Ephemeris Accuracy, m 0
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	r () Earth (X) Any Field of View (deg) 0.00
POWER (X) AC (X) DC Power, W Duration, Hrs/Day	
Operating 0 0.00 Standby 0 0.00 Peak 0 0.00 Voltage, V 0 Frequency, Hz	(X) Continuous

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made of

() Encription/Decription Re () Uplink Required: Comman On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Recording Rate (KBPS)	d Rate (KBS): 0 Required () Digital 0 8:88	Frequency (MIz): 0.00 Hours/Day 0.00 Voice (Hours/Day): 0.00 Other: Downlink command rate: 0 Downlink Frequency (MHz): 0.00	
TERNAL (X) Active () Passive Temperature, des C. One	erational Minimum 0 n-operational Minimum 0 rational Minimum 0 n-operational Minimum 0	Maximum 0 Maximum 0 Maximum 0 Maximum 0 Maximum 0	
QUIPMENT PHYSICAL CHARACTERIST	TICS ()		
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty	(X) Pressurized (0 W, m: 0.00 H, 0 W, m: 0.00 H, kg: 0 Re	Remote Unpressurized m: 0.00 Stowed m: 0.00 Deployed turn mass, kg: 0.00E+00	OF POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch wass, Consumable Ty Acceleration	(X) Pressurized (0 W, m: 0.00 H, 0 W, m: 0.00 H, kg: 0 Re) Unpressurized m: 0.00 Stowed m: 0.00 Deployed eturn mass, kg:	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS	(X) Pressurized (0) Unpressurized m: 0.00 Stowed m: 0.00 Deployed eturn mass, kg:	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch mass, Consumable Ty Acceleration REW REQUIREMENTS Crew Size 0	(X) Pressurized (0) Unpressurized m: 0.00 Stowed m: 0.00 Deployed eturn mass, kg:	ORIGINAL PAGE IS
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch wass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (0) Unpressurized m: 0.00 Stowed m: 0.00 Deployed eturn mass, kg:	POOR
Equipment ID/Function L, m: 0.0 L, m: 0.0 Launch wass, Consumable Ty Acceleration CREW REQUIREMENTS Crew Size 0	(X) Pressurized (0) Unpressurized m: 0.00 Stowed m: 0.00 Deployed eturn mass, kg:	POOR

SPECIAL CONSIDERATIONS/See Instructions
THIS LISSION HAS BEEN SUBDIVIDED INTO 5 OTV TECHNOLOGY DEMONSTRATION HISSIONS - SEE
BACK2063 THEO BACK2067

PAYLOAD LLEHEHT HAHE SPACECRAFT STRAIN & ACOUSTIC EM BACK2033	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Home JOSEPH HEYMAN Address	(X) Technology Development (A) Operations (B) Other (B) Mational Security (C) Type number (see table A) 0
Telephone 804/827-3418	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OFJECTIVE DEVELOP TECHNOLOGY NECESSARY TO EXAMINE SPACECRAFT STRUCTURES AND PROVIDE LONG-TERM STRUCTURAL VERIFICATION THROUGH ADVANCED HONDESTRUCTIV EVALUATION (NDE). TEST SUCH SYSTEMS ON EARLY SPACECRAFT MISSIONS AND IMPROVE TO MEET MONITORING MEEDS.	
DESCRIPTION ADVANCED ACOUSTIC EMISSION SENSORS DESIGNED AND BUILT INTO THE SPACECRAFT STRUCTURE WIL THE HISSION BY A PREPROGRAMMED COMPUTER. THE SENSORS WILL BE DEVELOPED AND TESTED ON TH TAKE ADVANTAGE OF OUR CURRENT RED PROGRAM OUTPUT TO PROVIDE STATE-OF-THE-ART SENSORS. A DESIGNED TO MONITOR STRAIN WITH ACOUSTICS AND FIBER-OPTIC INTERFEROMETRIC SENSORS WHICH AT LARC WILL BE STRUCTURALLY INTEGRATED AS WELL.	E GROUND AND WILL DDITIONAL SENSORS NAVE BEEN DEVELOPED ORIGINAL PA
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + - Inclination, deg Any Tolerance + - ilodal Angle, deg Any Ephemeris Accuracy, m	ALITY IN
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POWER () AC () BC Power, W Buration, Hrs/Day Operating 0 0.00 Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

EQUIPMENT PHYSICAL CHARACTE Location () Inter Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat	0.00 meters 0.00 meters ss, kg:		(C Re	0.00 me 0.00 me eturn ma	essurized ters ters ass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR
			101111111111111111111111111111111111111						
HERNAL (X) Active () Passi Temperature, deg C Heat Rejection, W	ve Operational Hinim Non-operational H Operational Hinim Hon-operational H	um inimum um inimum	0 0 0		Maximum Maximum Maximum Maximum	0 0			
Data Types: () An Film (Amount): Live TV (Hours/Day): On-Board Storage (Hb Data Dump Frequency Recording Rate (KBPS	it): 0:00 (Per Orbit) 0	a 1		Voic Othe Down	nlink comma	1000	0.00		
ATA/COMBUNICATIONS John Loring Requirements: () Hone () Encription/Decriptio () Uplink Required: Co On-Board Data Proces Description:	n Required maand Rate (KBS): sing Required	() Oti 0			quency (líllz				

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION HAS BEEN INTEGRATED INTO LSS-5.

PAYLOAD ELEMENT MANE LARGE STRUCTURES TECH EXPERIMENT BACK2038 CONTACT Name Address PO BOX 3999 SEATTLE, VA 98124	TYPE Science and Applications (Non-coun.) Commercial X Technology Development Operations Other National Security Type number (see table A) O Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO PROVIDE A TECHNOLOGY BASE FOR THE DESIGN AND ANALYSIS OF VERY LARGE SPACE STRUCTURES HAVING DIMENSIONS LARGER THAN ARE COMPATIBLE WITH SPACE SHUTTLE EXPERIMENTS.	
DESCRIPTION ASSENBLY AND TESTING OF VERY LARGE SPACE STRUCTURES WILL REQUIRE UTILIZATION OF THE SPACE FOR THESE ACTIVITIES. MAINTAINING A LONG LIFETIME STABLE PLATFORM FOR ASSEMBLY AND INECHARACTERIZATION TESTING IS IMPORTANT FOR THE EVOLUTION OF LARGE STRUCTURE TECHNOLOGY. THAT CAN BE USED FOR ASSEMBLY AND ENVIRONMENTAL TESTING WOULD BE REQUIRED ON THE SPACE FACILITY WOULD INCLUDE DATA ACQUISITION AND ANALYSIS CAPABILITIES MECHANICAL OPERATION MAINTEFANCE CAPABILITIES, AND A SUPPLY OF GOODS AND TOOLS TO ALLOW MODIFICATIONS TO LAWRING COMPLETE DYNAMIC TESTING CAPABILITIES UTLL BE REQUIRED TO DETERMINE NO PROPERTIES, DAMPING/INFLUENCE COEFFICIENTS, AND OTHER DESIGN PARAMETERS NECESSARY TO CENTRE THE COMPLETE OF VERY LARGE SPACE STRUCTURES.	RTIAL STRUCTURAL A LARGE FACILITY STATION. THIS S SUPPORT AND RGE STRUCTURE DESIGNS DE SHAPES. THERTIAL
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + - Inclination, deg Any Tolerance + - Ilodal Angle, deg Any Escape dV Required, m/s	HARACTERIZE THE CRA
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POUER () AC () DC Power, U Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00 () Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

Lonitoring Requirements: () Hone () Realtime () Encription/Decription Required: Command () Uplink Required: Command () On-Board Data Processing Description:	Rate (KBS): Required	0	Frequency (MIZ	0.00			
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital 0 0:00 0:00		Hours/Day Voice (Hours/D Other:	0.00 0ay): 0.00			
Data Dump Frequency (Per (Recording Rate (KBPS)	Orbit) 0 0.00		Downlink comma Downlink Frequ		0.00		
HERMAL (X) Active () Passive Temperature, des C Opera	ational Minimum operational Minimum ational Minimum operational Minimum	a 0	Maximum Maximum Maximum	0			
Heat Rejection, V Opera Non-c	operational Ninimum	n 0	Maximum	0			
QUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type	() External (X) Pressuriz 00 meters Wid	zed {} Ith: 0. Ith: Ret	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height: Height:	0.00 meters 0.00 meters	(Stoved) (Deployed)	99
QUIPHENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type Acceleration Se	() External (X) Pressuriz 00 meters Wid 00 meters Wid	zed {} Ith: 0. Ith: Ret	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height:	0.00 meters 0.00 meters	(Stoved) (Deployed)	OF PO
QUIPLENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type Acceleration Se	() External (x) Pressuriz 00 meters Vid 00 meters Vid 00 meters es ensitivity, (g)	zed {} Ith: 0. Ith: Ret	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height:	0.00 meters 0.00 meters	(Stoved) (Deployed)	POOR
QUIPHENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type Acceleration Se	(x) External (x) Pressuriz 00 meters Vic 00 meters Vic 0: 0 es ensitivity, (g) Task Assignments	zed {} Ith: 0. Ith: Ret	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height:	0.00 meters 0.00 meters	(Stoved) (Deployed)	POOR
QUIPHEIT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type Acceleration Secret Size 0	() External (x) Pressuriz 00 meters Vic 00 meters Vic es ensitivity, (g) Task Assignments Skill	zed () ith: 0. ith: 0. Ret min: 0	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	POOR
EQUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch mass, kg Consumable Type Acceleration Secret Size 0	() External (x) Pressuriz (x) Pressuriz (x) Pressuriz (x) Pressuriz (x)	zed {} ith: 0. ith: 0. Ret min: 0	Remote Unpressurized 00 meters 00 meters urn mass, kg:		0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION HAS BEEN DELETED - REDUNDANT WITH LSS TECH DEMO MISSONS.

PAYLOAD ELEMENT HAME CODE ATTITUDE CONTROL-SYSTEM IDENT EX BACX2039	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Hade JAMES E. RANDOLPH Address C.I.T. J.P.L. 4800 OAK GROVE DR. PASADENA, CA 91109	Commercial Technology Development Operations Other Ilational Security Type number (see table A)
Telephone STATUS () Operational () Approved () Planned () Candidate (X) Opports	Importance of the Space Station to this Element
Desired First Flight, Year: 0 Number of Flights 0	Duration of Flight, Days 0
TO VALIDATE SENSING STRATEGY/NECHANIZATION, IDENTIFICATION ALGORITHMS AND INTECRATED FLIGHT CONTROL DYNAMICS RECONSTRUCTION SUBSYSTEM; ESTABLISHING OFF-LINE AND REAL-TIME KNOWLEDGE OF FLEXIBLE SPACE STATION AND PAYLOAD DYNAMICS.	
DESCRIPTION THE EXPERIMENT WILL CONSIST OF DISTRIBUTED EXCITATION AND SENSING OF STRUCTURE RECORDED FOR OFF-LINE SYSTEM IDENTIFICATION OR PROCESSED SEQUENTIA	ALLY FOR ON-BOARD IDENTIFICATION.
	ORIGINAL OF POOR
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance Inclination, deg Any Hodal Angle, deg Any Escape dv Required, m/s	PAGE
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	(X) Any Lev (deg)
POWER () AC () DC Power, U Duration, Hrs/Day	
Operating 0 0.00 () Continuous Standby 0 0.00 () Continuous Peak 0 0.00 () Frequency, IIz 0	

Acceleration REW PEQUIREMENTS Crew Size 0 Skills (See Table B) EVA () Yes (X) No BERVICING/MAINTENANCE Service:	Task Assignment: Skill Level Hours/Day C	1 0.00 1 0.0	 	1 1 1 1 1 1			QUALITY
Acceleration REW PEQUIREMENTS Crew Size 0	Task Assignments Skill Level		1 1	1 1			QUALITY
Acceleration REW REQUIREMENTS Crew Size 0	Task Assignment	s l		<u> </u>	-		S QUALITY
Acceleration REW PEQUIREMENTS Crew Size 0	Task Assignment:	s I			 -		QUALI
Acceleration REW PROUTREMENTS		S					QU
Acceleration							~
Length: Launch mass, Consumable T	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: 0	ized (idth: (idth: (Remote Unpressurized 0.00 meters 0.00 meters cturn mass, kg:	l lleight: lleight: nx: 0.00E+00	0.00 meters 0.00 meters	(Stoved) (Deployed)	OF POOR
Heat Rejection, W Op	erational Minimum n-operational Minimu erational Minimum n-operational Minimu	na 0	Haximum Haximum Haximum Haximum	8	,		
Fila (Amount): Live TV (Hours/Day): On-Board Storage (Hbit) Data Dump Frequency (Pe Recording Rate (KBPS)	. 8:88		Voice (Hours Other: Downlink com	(Day): 0.00	0.00		
() On-Eogrd Data Processing Description: Data Types: () Analog		0	Frequency (II	Mz): 0.00			

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION WAS BEEN INCORPORATED INTO LSS-3 AND LSS-4.

PAYLOAD ELEIBHT HAME CODE ATTITUDE CONTROL-ADAPTIVE CONTRO BACK2040	TYPE () Science and Applications (Non-comm.)
CONTACT Name JAMES E. RANDOLPH Address C. I. T. J. L. 4800 ÖAR GRÖVE DR. PASADENA CA 91109	Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 0
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	l = Low Value, But Could Use 10 = Vita1 Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	n of Flight, Days 0
OBJECTIVE TO VALIDATE PERFORMANCE AND STABILITY IMPROVEMENT SENSING STRATEGIES AND MECHANIZATION, CONTROL GAIN UPDATE SUBROUTINES AND RECOFIGURATION SCHELES, AND ADAPTIVE CONTROL ALGORITHMS.	
DESCRIPTION THIS EXPERIMENT WILL EVALUATE ADAPTIVE CONTROL ALGORITHMS AND MEASUREMENT HIERARCHY FOR DEPLOYMING STRUCTURE. IT WILL INCLUDE ARTICULATION AND RECONFIGURATION OF PAYLOADS TO PROPERTIES AND EVALUATE ADAPTIVE CONTROL DESIGNS.	CHANGE SYSTEM MASS
CREIT CHARACTERISTICS Coosynchronous Orbit () Yes (K) No Apogee, km Perigee, km Tolerance + Inclination, deg Any Rodal Angle, deg Any Escape dv Required, m/s	PAGE IS
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POMIR () AC Power, U Operating Operating Standby Peak Voltage, V Operating Ope	

,

SERVICIUS/NATHTENANCE Service: Configuration Changes:	Interval Returnables Interval Deliverables	0 days 0 kg 0 days 0 kg		required	0.00 kg 0.00 kg		
EVA () Yes (X) No	Reason CONSTRUCTION			0.00			
	Hours/Day 0.00	0.00 1	0.00	1 1	<u>-</u>		~
	Level	1	ı	1 1	ī		9,
Skills (See Table B)	Skill	ı	1	1 1	i		AL
REW REQUIREMENTS Crew Size 0	Task Assignments			,			0
OUTPIEIT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: 0 ypes Sensitivity, (g) m	() Rev 0.00 r 0.00 r Return	meters mass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR QUALITY
	n-operational Minimum erational Minimum n-operational Minimum	0 0	Haximum Haximum Haximum Haximum	0			
Data Dump Frequency (Per Recording Rate (KBPS)	0.00	Do Do	ownlink commar ownlink Freque	nd rate: ency (MIz):	0.00		
Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Ebit)	0 Digital	Vo	ours/Day Dice (Hours/Da Ther:	ny): 0.00			
() Encription/Decription Ro () Uplink Required: Comman () On-Board Data Processing Description:	equired nd Rate (KES): 0 g Required	Fr	equency (111z)	0.00			
ATA/COLUMNICATIONS L'ouitoring Requirements: () Rone () Realtime () Encription/Decription Re	() Offline () Other	er:					

SPECIAL CONSIDERATIONS/See instructions
THIS HISSIGN HAS BEEN INTEGRATED INTO LSS-3.

PAYLOAD ELEIRET II. ATTITUDE CONTROL	AIE CONTROL EV	CODE		TYPE Science and Applications (Hop-count.)
CONTACT Heme JAMES Address CALIF	E. RAHDOLPH INST OF TECH J.P. K GROVE DR. EA, CA 91109			Commercial (X) Technology Development (Departions) (Departions) (Departions) (Departional Security)
Telephone STATUS				Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
() Operational) Planned () Candida		Scale = 0
Desired First Fli	ght, Year: 0	Number of Flight	s 0 Duration	of Flight, Days 0
TO VALIDATE HARDING COOPERAT DEPLOYMENT, AND P	IVE PAILOAD POINT	IND SYSTEMS FOR ACTIVE VIB THE, MODULAR CONTROL, CON STABILIZATION.	TROL DURING	
ACTUATORS AND CONTOF CONTROL VARIAT	TED ACTUATION ALC TROL SCHEHES, ART TOUS AS THE STRUC	COINT PAYLOAD VIBRATION/SHOWS WITH THE EXPERIMENTAL PICULATION AND DEPLOYMENT TURAL CONFIGURATION CHANGE TURE AND THE SPACE STATION	APE SENSING WITH A SENSOR A STRUCTURE WILL ALLOW OPTING OF PAYLOADS WILL ASSIST IN SES. A CONTROLLED COUPLING WILL	ATTACHED TO SPACE AL PLACEMENT OF FURTHER UNDERSTANDING JOULD EXIST OF POOR OUAL PAGE LIVER TO SPACE OF POOR OUAL PAGE OF PO
ORBIT CHARACTERIS Ceosynchronous Apogee, km Inclination, d Rodal Angle, d Escape dv Requ	es: Any	Perigee, km	Tolerance + Tolerance + Ephemeris Accuracy, m	17 m
Pointing Stabi	f known) acy, arc-sec 0.0	00 c-sec/sec 0.00	() Earth (X) Any Field of Vice (deg)	
POUNE () AG	() DC Power, U	Duration, Hrs/Day		
Operating Standby Peak Voltage, V	o 6	0.00 0.00 0.00 Frequency, Hz	(X) Continuous	

() Encription/Decription R () Uplink Required: Comma () On-Board Data Processin Description: Data Types: () Analo Film (Amount): Live TV (Fours/Day): On-Board Storage (Mbit) Data Dump Frequency (Pe Recording Rate (KBPS)	nd Rate (KBS): 0 g Required g () Digital : 8:88	Frequency (131z): 0.00 Hours/Day 0.00 Voice (Hours/Day): 0.00 Other: Downlink command rate: Downlink Frequency (131z)	0		
Heat Rejection, W Op	perational Minimum 0 n-operational Minimum 0 perational Minimum 0 n-operational Minimum 0	Maximum 0 Haximum 0 Haximum 0 Haximum 0			
QUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function	TICS () External (x) Pressurized 0.00 meters Width:	Remote Unpressurized 0.00 meters Unight:	0.00 meters	(Stoved)	
Length: Launch mass, Consumable T	0.00 meters Width:	0.00 meters Return mass, kg:	0.00 meters	(Deployed)	OF F
Length: Launch mass, Consumable T Acceleration	0.00 meters Width: kg: 'ypes	0.00 meters Return mass, kg:	0.00 meters	(Deployed)	OF POOR
Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS	0.00 meters Width: kg: ypes Sensitivity, (g) min:	0.00 meters Return mass, kg:	0.00 meters	(Deployed)	OF POOR QU
Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	0.00 meters Width: kg: ypes Sensitivity, (g) min: Task Assignments	0.00 meters Return mass, kg:	0.00 meters	(Deployed)	OF POOR QUAL
Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	O.00 meters Width: kg: Sypes Sensitivity, (g) min: Task Assignments	0.00 meters Return mass, kg: Height: 0.00E+00 max: 0.00E+00	0.00 meters	(Deployed)	OF POOR QUALITY
Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0	0.00 meters Width: kg: Sypes Sensitivity, (g) min: Task Assignments Skill Level	0.00 meters Return mass, kg: Height: 0.00E+00 max: 0.00E+00	0.00 meters	(Deployed)	OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION MAS BEEN INTEGRATED INTO LSS-3.

PAYLOAD ELEIEHT HAIR ZERO-G ANTERHA RANGE COM EXPERT BACK 2042 CONTACT Hale JAMES E. RANDOLPH M/S 156-220 Address JPL 4860 OAK GROVE DR. PASADENA, CA 91109	TYPE () Science and Applications (Non-comm.) () Commercial () Technology Development () Operations () Other () Hational Security
Telephone 213/354-2732	Type number (see table A) 0 Importance of the Space Station to this Element - 1 = Low Value, But Could Use 10 = Vital
() Operational () Approved () Planned () Candidate (K) Opportunity	Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Durati	on of Flight, Days 0
OBJECTIVE TO EXPEDITE THE DEVELOPHENT OF LARGE DIAMETER ANTENNAS FOR COMMUNICATION SATELLITES, OVLBI, ODSRS, ETC., PROVIDING A REALISTIC ENVIRONMENT FOR DEVELOPMENT AND PROTOTYPE QUALIFICATION TESTING OF SUBSYSTEMS AND EQUIP- HENT FOR CONTROL OF SURFACE DISTORTIONS AND FEED STRUCTURE DEFLECTIONS. DESCRIPTION A FACILITY WOULD BE DEVELOPMENT TO PROVIDE IN SITU PATTERN MEASUREMENTS OF ANTENNA E	EAN QUALITY AND
IULTIPLE SITULTAMEOUS BEAM ISOLATION. A SPACE STATION BASED THE WOULD BE USED TO PROTILLUMINATION.	
	OF POOR
ORBIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, Lm. Inclination, deg Any Llodal Angle, deg Any Escape dV Required, m/s Perigee, km Tolerance + Tolerance + Ephemeris Accuracy, m	PAGE IS
POINTING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Art Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	у
POWER () AC () DC Power, W Duration, Wrs/Day	
Operating 0 0.06 Standby 0 0.06 (X) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

DATA/COLUMNICATIONS Conitoring Requirements: () None () Realtime () Encription/Decription Re () Uplink Required: Comman	quired d Rate (KBS): 0		Frequency (121z)	: 0.00			
() On-Board Data Processing Description: Data Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit):	() Digital 0 0.00 0.00		Hours/Day Voice (Hours/Da Other:		•		
Data Dump Frequency (Per Recording Rate (KBPS)	0.00		Downlink Comman Downlink Freque		0.00		
THERMAL (X) Active (X) Active (X) Active (X) Passive (X) Passive (Y) Passive	rational Minimum -operational Minimum rational Minimum -operational Minimum	0 0 0 0	Maximum Maximum Maximum Maximum	0 8 0			
Consumable Ty	(X) Pressurized .00 meters Width:	0.00 0.00 Retur	meters n mass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	ORIO OF I
CREW REQUIREMENTS Crew Size 0	Task Assignments						ORIGINAL PAGE IS
Skills (See Table B)	Skill		I	1 1			0.0
	Level	- 1		1 1	1		ALE
	Hours/Day 0.00	0.00	0.00	1 1	!		32
EVA () Yes (X) No	Reason CONSTRUCTION		Hours/EVA	0.00			
SERVICING/NATHTENANCE	Interval	0 days	Consumable		0 kg		
Configuration Changes:	Returnables Interval Deliverables	0 kg 0 days 0 kg		Required	0.00 0.00 0 kg		

SPECIAL CONSIDERATIONS/See instructions THIS HISSION HAS BEEN INTEGRATED INTO LSS-3.

ience and Applications (Non-comm.) memorial chnology Development cerations her tional Security number (see table A) 0 cance of the Space Station to lement ow Value, But Could Use vital = 0 cht, Days 0
lement ow Value, But Could Use Vital = 0
ERAL SIZE ACE STATION OF POOR OF POOR
AGE IS
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Louitoring Requirements: () Realtim () Encription/Decription () Uplink Required: Common Co	ne () Offline () Other: Required nand Rate (KBS): 0	Frequency (lalz):	0.00			
Description: Data Types: () Anal Film (Amount): Live TV (Hours/Day): On-Loard Storage (Hbit	og () Digital	Hours/Day Voice (Hours/Day) Other:	0.00			
Recording Rate (KBPS)	0.00	Downlink command Downlink Frequence		0.00		
HERIAL (X) Active () Passive Temperature, deg C 0 Heat Rejection, W 0	operational Minimum 0 Operational Minimum 0 Operational Minimum 0 Operational Minimum 0	Naximum Naximum Naximum Naximum	0		:	
	on operational minimum o	rica India				
QUIPIERT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Leunch mass Consumable	STICS	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg:	eight: eight:	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POO
QUIPHERT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External (X) Pressurized (A) Pressurized (B)	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg:	eight:		(Stowed) (Deployed)	OF POOR QU
QUIPHERT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	STICS (X) External (X) Pressurized 0.00 meters Width: 0.00 meters Width: f, kg: Types on Sensitivity, (g) min:	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg:	eight:		(Stowed) (Deployed)	OF POOR QUALI
COUTPHEET PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleration	STICS (X) External (X) Pressurized (0.00 meters Width: 0.00 meters Width: x; kg: Types on Sensitivity, (g) min: Task Assignments	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg:	eight:		(Stowed) (Deployed)	OF POOR QUALITY
QUIPMENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleration Crew Size ()	STICS (X) External (X) Pressurized (O.00 meters Width: O.00 meters Width: Rypes on Sensitivity, (g) min: Task Assignments Skill	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg: 0.00E+00 max:	eight:		(Stowed) (Deployed)	OF POOR QUALITY
OUTPHERT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleration Crew Size ()	STICS (X) External (X) Pressurized (O.00 meters Width: O.00 meters Width: Reg: Types on Sensitivity, (g) min: Task Assignments Skill	Remote Unpressurized 0.00 meters 0.00 meters eturn mass, kg: 0.00E+00 max:	eight: 0.00E+00		(Stowed) (Deployed)	OF POOR QUALITY
COUTPHENT PHYSICAL CHARACTERI Location () Interna Equipment ID/Function Length: Length: Launch mass Consumable Acceleration Crew Size () Skills (See Table B)	STICS { X External { 0.00 meters Width: 0.00 meters Width: 0.00 meters Width: R Sensitivity, (g) min: Task Assignments Skill	Remote Unpressurized 0.00 meters He 0.00 meters He 0.00 meters He 0.00E+00 max: 0.00E+00 max: 0.00 1 1	0.00E+00		(Stowed) (Deployed)	OF POOR QUALITY

SPECIAL COMSIDERATIONS/Sec instructions
THIS INSSIGN HAS BEEN INCOPPORATED INTO LSS-3.

PAYLOAD ELEMENT HAME CODE SPACECRAFT MATERIALS TECHHOLOGY BACK2044	TYPE Science and Applications (Non-comma.)
CONTACT Using G.F. SYKES Address LANGLEY	Commercial (X) Technology Development Operations Other National Security Type number (see table A) 0
Telephone 804/827-3110	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OEJECTIVE TO PROVIDE A TECHNOLOGY DATA BASE FOR LONG TERM USE OF ADVANCED PATERIALS IN SPACE.	
DESCRIPTION THE PROPOSED HISSION WOULD PROVIDE A UNIQUE OPPORTUNITY TO DEVELOP A LONG TERM SPACE END PROPOSED HISSION WOULD PROVIDE A UNIQUE OPPORTUNITY TO DEVELOP A LONG TERM SPACE END DURABILITY DATA BASE ON ADVINCED THERNAL CONTROL COATINGS, ADMESIVES, COMPOSITES, AND PROPERTIES OF EACH EXPOSURE PARAMETERS COMBINED, ON THE PROPERTIES OF THESE MATERIALS. IN SITU EVALUATION OF PROPERTIES COMBINED,	OLYMER FILMS. ETER, BOTH SINGLY OULD BE PERFORMED. OULD BE PERFORMED. OULD BE PERFORMED.
OPBIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, ha Perigee, km Tolerance + - Inclination, deg Any Nodal Angle, deg Any Escape dv Required, m/s	. 3m
POLITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POUER () AC () DC Power, W Duration, Hrs/Day	
Operating 0 0.00 () Continuous 5 0.00 () Continuous 6.00 () Continuous	

Conitoring Requirements: () Hone () Realtime () Encription/Decription R () Uplink Required: Comma On-Board Data Processin Description:	equired) Other: O		quency (1.Hz):	0.00			
Description: Data Types: () Analo Film (Amount): Live TV (Lours/Day): On-Board Storage (Hbit)	og () Digital			rs/Day ce (Nours/Day): er:	0.00 0.00			
Data Dump Frequency (Pe Recording Rate (KBPS)	orbit) 0 0.00			nlink command n nlink Frequency		0.00		
THERMAL (X) Active () Passive Temperature, deg C Op Ilo Ileat Rejection, W Op No	perational Minimum on-operational Minimu perational Linimum on-operational Minimu	m 0		Haximum Haximum Haximum Haximum	0 0 0 0			
QUIPLEHT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T	0.00 meters Wi 0.00 meters Wi kg: 0	dth: dth:	0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight: ight: .00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR
QUIPLEIT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg:	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight:			OF POOR QUA
QUIPHERT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: 'ypes Sensitivity, (g)	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight:			OF POOR QUALIT
QUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REM! REQUIREMENTS Crew Size 0	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: 0 'ypes Sensitivity, (g) Task Assignments	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight:			OF POOR QUALITY
QUIPMENT PHYSICAL (UARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REM REQUIREMENTS Crew Size 0	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: cypes Sensitivity, (g) Task Assignments Skill	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight:			OF POOR QUALITY
QUIPMENT PHYSICAL (UARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REM REQUIREMENTS Crew Size 0	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: Cypes Sensitivity, (g) Task Assignments Skill Level	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg:	ight:			OF POOR QUALITY
COUTPIENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pressuri 0.00 meters Wi 0.00 meters Wi kg: Cypes Sensitivity, (g) Task Assignments Skill Level Hours/Day	dth: dth: min:	() Unpr 0.00 me 0.00 me Return m	essurized ters Hei ters Hei ass, kg: 00 max: 0	.00E+00			OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION WAS BEEN INTEGRATED INTO LSS-5.

PAYLOAD ELEMENT NAME CODE . SPACECRAFT COUTROL TECH DEVELOPH BACK2045	TYPE Science and Applications (Non-comma.)
COUTACT Have L.U. TAYLOR JR Address LIGL	(X) Technology Development () Operations () Other () National Security Type number (see table Δ) 0
Telephone	Importance of the Space Station to this Element
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OBJECTIVE EVALUATE ADAPTIVE CONTROL TECHNIQUES REQUIRED BY ADVANCED SPACE STATION CONFIGURATIONS. THESE ADAPTIVE CONTROL TECHNIQUES WILL INCLUDE CLOSED— LOOP SYSTEMS IDENTIFICATION.	
DESCRIPTION ADVANCED ADAPTIVE CONTROL LAWS WILL BE PROVIDED AS SELECTABLE ALTERNATIVES TO OPERATION VARIOUS ADVANCED TECHNIQUES WILL BE EVALUATED WITH THE OPERATIONAL SYSTEM SERVING AS A	
ORDIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + - Inclination, deg Any Rodal Aggle, deg Any Escape dv Required, m/s	DALITY IS
POLITING/ORIENTATION View Direction View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg)	
POURR () AC () BC Pover, U Duration, Brs/Day Operating 0 0.00 Standby 0 0.00 (X) Continuous Peck 0 0.00 Voltage, V 0 Frequency, Hz 0	

The second secon

Horitoring Requirements: (Required (KES):	() Oth 0	er:		quency (III:				
Data Types: () Analogrical Tiles (Amount): Live TV (Hours/Day): On-Eoard Storage (Hbit)		1		Voi	rs/Day ce (Hours/Der:	0.0 0ay): 0.0			
Data Dump Frequency (Pe Recording Rate (KBPS)	o.00 er Orbit) 0 0.00				mlink commo		: 0.00		
HERIAL (%) Active () Passive									
Temperature, deg C O _I No No O _I No	perational Minimu on-operational Mi perational Minimu on-operational Mi	a niaum a niaura	8		Maximum Haximum Maximum Maximum	8			
	STICS							 	
QUIPLENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration	STICS () Exte (x) Pres 0.00 meters 0.00 meters kg: 0	Width: Width:	R	0.00 me 0.00 me eturn m	ters ass, kg:	Height: Height:	0.00 mete	red) loyed)	OF POOR
QUIPLEMT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration	STICS () Exte (x) Pres 0.00 meters 0.00 meters , kg: Types	Width: Width:	R	0.00 me 0.00 me eturn m	ters ters ass, kg:	Height:	0.00 met	ved) loyed)	OF POOR Q
QUIPLEMT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration	O.00 meters 0.00 meters 0.00 meters 0.kg: Types n Sensitivity, (g	Width: Width:	R	0.00 me 0.00 me eturn m	ters ters ass, kg:	Height:	0.00 met	ved) loyed)	OF POOR QUAL
QUIPLEHT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration REU REQUIREMENTS Crev Size 0	STICS () Exte (x) Pres 0.00 meters 0.00 meters 0 kg: Types n Sensitivity, (g	Width: Width:	R	0.00 me 0.00 me eturn m	ters ters ass, kg:	Height:	0.00 met	ved) loyed)	OF POOR QUALITY
QUIPLEHT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration REU REQUIREMENTS Crev Size 0	O.00 meters O.00 meters Kg: Types Sensitivity, (g	Width: Width: ments	R	0.00 me 0.00 me eturn m	ters ters ass, kg:	Height:	0.00 met	red) loyed)	OF POOR QUALITY
QUIPLEHT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration REU REQUIREMENTS Crev Size 0	O.00 meters O.00 meters O.00 meters Figure 1 O.00 meters O.00 met	Width: Width: ments	R	0.00 me 0.00 me eturn m	ters ters ass, kg:	Height: 0.00E+00	0.00 met	ved) loyed)	OF POOR QUALITY
EQUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable 1 Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B) EVA () Yes (X) No SERVICING/PAINTENANCE Service:	O.00 meters O.00 meters O.00 meters Fypes Sensitivity, (g Task Assignment Skill Level Hours/Day	Width: Width: I I I I	in:	0.00 me 0.00 me eturn m	ters ters ters ass, kg: 00 max	Height: 0.00E+00	0.00 met	ved) loyed)	OF POOR QUALITY

SPECIAL COMSIDERATIONS/See instructions THIS LASSION WAS BEEN INTEGRATED INTO LSS-3.

PAYLOAD ELEMENT HAME ADVANCED CONTROL DEVICE TECH DEN EACX2046 CONTACT Hame C.R. KECKLEV Address LANCLEY	TYPE {
Telephone STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	
OBJECTIVE EVALUATE CONDUCTION STORAGE CONTROL DEVICES (E.G., THIRD GENERATION CONTRO HOWELT GYROS (CHG'S), SECOND GENERATION MAGNETICALLY SUSPENDED MOMENTUM RINGS (ACHD'S)) REQUIRED BY ADVANCED SPACE STATION CONFIGURATIONS.	
DESCRIPTION ADVANCED CONTROL DEVICES WILL BE PROVIDED AS SELECTABLE ALTERNATIVES TO OPERATIONAL COVARIOUS ADVANCED DEVICES WILL BE EVALUATED WITH THE OPERATIONAL SYSTEM SERVING AS A BA	ORIGINAL OR POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km. Perigee, km. Tolerance + Inclination, deg Any Tolerance + Inclination, deg Any Escape dV Required, m/s	PAGE IS
POLITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POWER (X) AC () DC Power, W Duration, Wrs/Day Operating 0 0.00 Standby 0 0.00 (X) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Mz 0	

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DATA/COLAULICATIONS Louitoring Requirements: (quired d Rate (KDS): 0 Required () Digital 0.00 0.00	ther:	Frequency (IMz) Hours/Day Voice (Hours/Da Other: Downlink comman	0.00 ny): 0.00 nd rate:	0.00		
THERMAL (X) Active () Passive Temperature, deg C Ope Hon Heat Rejection, W Ope Hon	rational Hinimum -operational Hinimum rational Hinimum -operational Hinimum	0 0 0	Haximum Haximum Haximum Haximum	8			
Consumable Ty	(X) Pressurized .00 meters Vidth .00 meters Vidth ks:	: 0. Ret	00 meters urn mass, kg:	Height: Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	ORIGINAL OF POOR
CREW REQUIREMENTS Crew Size 0	Task Assignments						PAGE IS
Skills (See Table B)	Skill	1	1 1	1 1	-		7 7
	Level	1	1 1	1 1	ī		
	Hours/Day	1	<u> </u>	1 . 1	i		
EVA () Yes (X) No	Leason		Hours/EVA	0.00			
SERVICIUC/HAIHTEHAHCE Service: Configuration Changes:	Interval Returnables Interval Deliverables	0 da 0 kg 0 da 0 kg	lian hours	required Required	0 kg 0.00 0.00 0 kg		

SPECIAL CONSIDERATIONS/See instructions
THIS INSSION WAS BEEN INTEGRATED INTO LSS-3.

PAYLOAD ELECTIVE HAIR TECHNOLOGY BACX2047		TYPE Science and Applications (Non-	-colm.)
CONTACT Usue U.M. ADELMAN Address		(X) Technology Development () Operations () Other () National Security Type number (see table A) 0	
Telephone 827-3451		Importance of the Space Station to this Element 1 = Low Value, But Could Use)
STATUS () Operational () Approved () Planned () Candidate	e (X) Opportunity	10 = Vital Scale = 0	
Desired First Flight, Year: 0 Number of Flights	0 Duratio	on of Flight, Days 0	
OBJECTIVE THE FEASIBILITY OF CONTROLLING SHAPE DISTORTION BY HEATING.	ON-BOARD		
DESCRIPTION A LARGE FLEXIBLE PANEL WILL BE ATTACHED TO THE SPACE STATION NUMBER OF LOCATIONS, SENSOPS LOCATED ON THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION IN THE PANEL WILL PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION IN THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO GENERATE A TEMPERATURE DISTRIBUTION OF THE PANEL WILL DETECTIVE HEATERS TO THE PANEL WILL DETECTIVE H	T DEVIATIONS FROM THE REC	TO THE PANEL AT A DUIRED SHAPE AND TRIGGER UNIVANTED DISTORTIONS.	ORIGINAL PAGE 19
ORPIA CHARACTERISTICS Synchronous Orbit () Yes (X) No Perigee, km Inclination, deg Rodal Angle, deg Escape dv Required, m/s	Tolerance + Tolerance + Ephemeris Accuracy, m		₹ <i>1</i> 8
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	() Earth (X) Any Field of View (deg)		
POUEE: () AC Pover, U Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00	(X) Continuous		
Postage, v 8 Frequency, Hz	0		

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Conitoring Requirements: () Hone () Realtim () Encription/Decription () Uplink Required: Common Conference Processing Description:	Pocuired		Frequency (1312): 0.00			
Data Types: () Anal Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbjt	og () Digital		Nours/Day Voice (Nours/D Other:	ay): 0.00 0.00			
Data Dump Frequency (P Recording Rate (KBPS)	er Orbit) 0 0.00		Downlink comma Downlink Frequ		0.00		
Heat Rejection, W 0	perational Minimum on-operational Minimum perational Minimum on-operational Minimum	8	Haximum Maximum Maximum Maximum	8			
Equipment ID/Function Length: Length: Launch mass Consumable	0.00 meters Widt 0.00 meters Widt kg: Types	h: 0. Ret	Remote Unpressurized 00 meters 00 meters urn mass, kg:	Height: Height:	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR Q
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	0.00 meters Widt 0.00 meters Widt 0.00 meters Widt	h: 0. Ret	Unpressurized 00 meters 00 meters urn mass, kg:	Height:			00
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	(X) Pressurize 0.00 meters Widt 0.00 meters Widt kg: types n Sensitivity, (g)	h: 0. Ret	Unpressurized 00 meters 00 meters urn mass, kg:	Height:			00
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio CREN REQUIREMENTS Crew Size 0	(X) Pressurize 0.00 meters Widt 0.00 meters Widt kg: Types n Sensitivity, (g) Task Assignments	h: 0. Ret	Unpressurized 00 meters 00 meters urn mass, kg:	Height:			00
Length: Length: Launch mass Consumable Acceleratio CREU REQUIREMENTS Crew Size 0	(X) Pressurize 0.00 meters Widt 0.00 meters Widt kg: 0 types n Sensitivity, (g) Task Assignments Skill	h: 0. Ret	Unpressurized 00 meters 00 meters urn mass, kg:	Height:			OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio CREN REQUIREMENTS Crew Size 0	(X) Pressurize 0.00 meters Widt 0.00 meters Widt kg: Types n Sensitivity, (g) Task Assignments Skill Level	h: 0. Ret	Unpressurized 00 meters 00 meters urn mass, kg:	0.00E+00			00

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PAYLOAD ELEIGAT HATE ACTIVE OPTICS TECHNOLOGY BACX2048	TYPE Science and Applications (Non-comm.)
CONTACT Haue DAVID EINITS Address AMES RESEARCH CENTER	(X) Technology Development () Operations () Other () National Security Type number (see table A) 0
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candida	te (X) Opportunity
Desired First Flight, Year: 0 Number of Flight	s 0 Duration of Flight, Days 0
OBJECTIVE TO PROVIDE A TECHNOLOGY BASE FOR THE OPERATION AND CONSTRUCT LARGE-APERTURE SEGMENTED HIRRORS HAVING HIGH SURFACE ACCURATEFICURE. DESCRIPTION THE PROPOSED HISSION WILL INVESTIGATE CRITICAL TECHNOLOGICA SEGMENTED ACTIVE REFLECTORS IN FUTURE SPACE PROJECTS. KEY A SURFACE FIGHER AND SEGMENT ORIGINATION THROUGH POSITIONAL A	L ISSUES GERMANE TO THE USE OF LARGE MULTI-
SURFACE FIGURE AND SEGMENT ORIENTATION THROUGH POSITIONAL A OPTICAL THACE QUALITY THROUGH WAVEFRONT SENSING AND LASER RECEIVERAL VIBRATION CONTROL OF THE TRUSS SUPPORT STRUCTURE POINTING OF THE ANTENNA ASSEMBLY. SINCE THE TECHNOLOGICAL RECEIVERS, AND OPTICAL ISSUE CRYOGENIC ENGINEERING; HICROWAVE RECEIVERS, AND OPTICAL FIRE	EADINESS OF THE ASSEMBLED REFLECTOR WILL BE
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, km Inclination, deg Eodal Angle, deg Escape dV Required, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, w
POINTING/ORIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Pestrictions (Avoidance)	() Earth (X) Any Field of View (deg)
POUER () AC () DC Power, U Duration, Brs/Day Operating 0 0.00 Standby 0 6.00 Posk 0 0.00 Voltage, V 0 Frequency, Hz	() Continuous

Control Requirements: () Rone () Encription/Decription F	'equired	LINGI.	Frequency (131z): 0.00			
() Uplink Required: Comma On-Board Data Processin Description: Data Types: () Analo	ng Required						
Data Types: () Analogous () Analogous () Live TV () Hours / Day): On-Board Storage () Dit)	og () Digital 0.00 0: 0.00		Voice (Hours/D Other:				
Data Dump Frequency (Pe Recording Rate (KBPS)	orbit) 0 0.00	Downlink command rate: 0 Downlink Frequency (FMz): 0.00					
WERNAL (%) Active () Passive							
Temperature, deg C Or	perational Hinimum on-operational Hinimum perational Hinimum on-operational Hinimum	0	Haximum Haximum	0 0 0			
OUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function	(X) Pressurized	{}	Remote Unpressurized				
QUIPLEMT PHYSICAL (CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass Consumable Acceleration	(X) Pressurized 0.00 meters Width 0.00 meters Width	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stoved) (Deployed)	OF F
QUIPMENT PHYSICAL (CHARACTERIS) Location () Internal Equipment ID/Function Length: Length: Launch mass Consumable Acceleration	(X) Pressurized 0.00 meters Width 0.00 meters Width kg: 0	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	Height:			OF POO
OUIPHENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable of Acceleration	(X) Pressurized 0.00 meters Width 0.00 meters Width kg: Types a Sensitivity, (g)	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	Height:			OF POOR Q
GUIPHENT PHYSICAL (CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable Acceleration PEN REQUIREMENTS Crew Size 0	(X) Pressurized 0.00 meters Width 0.00 meters Width kg: Types Sensitivity, (g) Task Assignments	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	Height:			OF POOR QUA
GUIPHERT PHYSICAL (CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable Acceleration PEN REQUIREMENTS Crew Size 0	(X) Pressurized 0.00 meters Width 0.00 meters Width kg: 0 Types n Sensitivity, (g) Task Assignments Skill	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	Height:			OF POOR QUALITY
GUIPHERT PRYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable of Acceleration PEN REQUIREMENTS Crew Size 0	(X) Pressurized 0.00 meters Width 0.00 meters Width kg: 0 Types Sensitivity, (g) Task Assignments Skill	e 0.	Unpressurized 00 meters 00 meters urn wass, kg:	0.00E+00			OF POOR QUALITY
COULDIERT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable Acceleration CRED REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pressurized 0.00 meters Width 0.00 meters Width 1 kg: 1 ypes 1 Sensitivity, (g) Task Assignments 1 Skill 1 1 Level 1 1 Hours/Day 1	e 0.	Unpressurized 00 meters 00 meters urn mass, kg: 0.00E+00 max:	0.00E+00			OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions
THIS HISSION HAS BEEN INTEGRATED INTO LSS-4.

PAYLOAD ELEMENT DAME CODE ENCK2049	TYPE () Science and Applications (Hoperson)
CONTACT Hame Address GALY P. BARIMARD JACK EVANS GODDARD SPACE FLICHT CEN	Science and Applications (Non-comm.) Commercial (X) Technology Development Operations Other Hational Security Type number (see table A)
Telephone	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	1 = Low Value, But Could Use 10 = Vital
Desired First Flight, Year: 0 Number of Flights 0 Duration OLJECTIVE TO DEVELOP THE TECHNOLOGY FOR NEW, SELF-SUPPORTING, STABLE AND HIGHLY RIGID STRUCTURES FOR SPACECRAFT AND SPACE SYTEMS BASED ON GRODESIG	of Flight, Days 0
DESCRIPTION THIS MISSION CAN PROVIDE THE TECHNOLOGY BASE REQUIRED TO BUILD AND UTILIZE GEODESIC STRUCTURY, EXPANDIBILITY AND REUSABILITY IN SPACE ENVIRONMENTS. AN EXAMPLE OF GEODESIC STRUCTURY, EXPANDIBILITY AND REUSABILITY IN SPACE ENVIRONMENTS. AN EXAMPLE OF GEODESIC STRUCTURY OF THE TRIANGULAR COUNTY OF THE LENGTH OF 12 FT. THE TRIANGULAR COUNTY OF THE TRIANGULAR COUNTY OF THE TRIANGULAR COUNTY OF THE TRIANGULAR COUNTY OF THE CONPONENTS COULD EASILY FIT INTO THE MASSIBLED ON-ORDIT AS DESIRED. WHEN RECESSARY, THE TRIANGUES CAN BE REHOVED TO REPAIR OF THE STRUCTURE CAN ALSO BE DISASSEPPLED FOR USE IN THE CONSTRUCTION OF LARGEBULLITY OF THESE STRUCTURES ARE A NATURAL EXTENSION OF HODULARIZATION AND STANDARD INTO ABILITY OF THESE STRUCTURES TO PERFORM AS STABLE, RIGID PLATFORMS FOR LIGH RESOLUTION IN	TRUCTURE IS A 22 FT THE SAME SIZE AND SPACE SHUTTLE BAY ETTS CAN THEN BE OR REPLACE THEIR EER CEODESIC SPHERES.
CEBIT CRARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + - Inclination, deg Any Tolerance + - Note that the property of the	ERFACE SYSTEMS. THE CONTROL OF THE C
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) Field of View (deg)	
POWER () AC Power, W Duration, Ers/Day Operating 0 0.00 Standby 0 0.00 (E) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Ez 0	
voltage, V 0 Frequency, Hz 0	

U

DATA/COLUMNICATIONS Liouitoring Requirements: () Hone () Realtime () Encription/Decription Required: Command () On-Board Data Processing Rescription: Data Types: () Analog Film (Amount): Live TV (Lours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Concording Rate (KBPS)	Rate (KES): 0 Required () Digital 0 0:00	Other:	Other: Downlink com	/Day): 0.00	0.00		
THERIAL (X) Active () Passive Temperature, des C. Opera	ntional Hinimum Operational Hinimum Ational Hinimum Operational Hinimum	0 8 8	Haximum Haximum Haximum Haximum	8		:	
EQUIPMENT PHYSICAL CHARACTERISTIC Location () Internal Equipment ID/Function Length: 0.0 Length: 0.0 Launch wass, kg Consumable Type	(x) External (x) Pressurize 00 meters Widt 00 meters Widt	ed (h: (h: (Remote Unpressurized 0.00 meters 0.00 meters cturn mass, kg: 0.00E+00 ma	Height: Height: x: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR
CREW REQUIREMENTS Crew Size 0	Task Assignments						0.0
Skills (See Table B)	Skill	ı	1 1	1 1	<u>_</u>		QUALITY QUALITY
	Level	1	1 1	1 1	I		7 50
	Hours/Day	ı	1 1	1 1			
EVA () Yes (X) Ho	Reason		Hours/E	0.00 AV			
SERVICING/MAINTENANCE Service: Configuration Changes:	Interval Returnables Interval Deliverables	0 1	lays lian/llou	rs required rs Required	0.00 kg 0.00 0.00 kg		

SPECIAL CONSIDERATIONS/See instructions
THS HISSION WAS BEEN SET ASIDE FOR LACK OF A CUSTOMER HISSION.

PAYLOAD ELEMENT MAKE LARGE SPACE STRUCTURE TECHNOLOGY EACK2050	TYPE Science and Applications (Hon-comm.)
CCHTACT II CARE DICK GATES Address UILLIAN UALES HSFC	(X) Technology Development () Operations () Other () National Security Type number (see table A) 0
Telephone 205/453-4195 STATUS () Operational () Approved () Planned (X) Candidate () Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration of	of Flight, Days 0
OBJECTIVE TO PROVIDE A TECHNOLOGY BASE FOR SYSTEMS, IN THE LARGE STRUCTURES CLASS, REQUIRING CONSTRUCTION AND/OR ASSEMBLY UTILIZING SUPPORT FROM A MANUED ORDITAL STATION, THESE TECHNOLOGY DEVELOPMENT MISSION(S) WILL ALSO UTILIZE CROWN FACILITIES AND ORBITER TESTS FOR SMALL, SHORT DURATION, SEGREGATED EXPERIMENTS.	
DESCRIPTION: THE HISSIGN PROPOSED WILL PROVIDE THE TECHNOLOGY REQUIRED FOR THE CONSTRUCTION AND ASSESSINGTON PROPOSED WILL PROVIDE THE TECHNOLOGY REQUIRED FOR THE CONSTRUCTION AND ASSESSING THE THIS TECHNOLOGY DEVELOPMENT ARE: SUPPORT EQUIPMENT INTERFACES; MAIN, MAINTACHTHE FUNCTIONS; DEVELOP CREW SKILL REQUIREMENTS AND SPACE STATION OPERATIONAL INTERFACEOUTIC CONSTRUCTIONS WILL ALSO BE CONSIDERED IN DEVELOPING THIS TECHNOLOGY.	HELY OF LARGE TATION. KEY ISSUES -HACHINE, AND ACE REQUIREMENTS. PAGE PAGE PAGE PAGE PAGE PAGE PAGE PAG
ORDIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogee, La. Inclination, deg Hodal Angle, deg Escape dV Required, m/s Perigee, kn Polerance + - Ephemeris Accuracy, m	之國
POHITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
POWER () AC Power, U Duration, Hrs/Day Operating Standby Operating Operating Standby Operating Operat	

DATA/COMMUNICATIONS Lonitoring Requirements: Mone Realtime Board Peription R Uplink Required: Comma On-Board Data Processin Description: Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit) Data Dump Frequency (Perecording Rate (KDPS)	ad Rate (KBS): 0 g Required g () Digital 0 0:00		Other: Downlink		000	
	erational Kinimum n-operational Minimum erational Minimum n-operational Minimum		Haxii Haxii Haxii Haxii	aum aum 8		
EQUIPMENT PHYSICAL CHARACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable I	TICS () External (X) Pressurize 0.00 meters Widt 0.00 meters Widt kg: 0 ypes Sensitivity, (g)	d { h: 0 h: 0 Re	Remote Unpressuria .00 meters .00 meters turn mass, ka	Height: Height:	0.00 meters 0.00 meters	(Stoved) (Deployed) OP OP TO GO
CREW REQUIREMENTS Crew Size 0	Task Assignments					DOR QUALITY
Skills (See Table B)	Skill	1	1 1	ı	<u> </u>	23
	Level	1	1 1	1	1 1	PÉ
	Hours/Day	1	1 1	ī	ī ī	35
EVA () Yes (X) No	Reason			s/EVA 0.00		
SERVICING/MAINTENANCE Service: Configuration Changes:	Interval Returnables Interval Deliverables	0 1	g Han Han Han /	umables hours required Hours Required rnables	0.00	

SPECIAL CONSIDERATIONS/See instructions REDWIDARY WITH LSS-1 & LSS-2.

PAYLOAD ELEMENT HAVE COUTFOILED ACCELERATION PROPULSI CODE BACK2651	TYPE Science and Applications (Non-comma.)
CONTACT Lane DAVID C. BYERS Address JACK EVANS CODDARD SPACE FLIGHT CEN	(X) Technology Development () Operations () Other () National Security Type number (see table A) 0
Telephone (216) 433-4000 X	Importance of the Space Station to
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	1 = Low Value, But Could Use 10 = Vital Scale = 0
Desired First Flight, Year: 0 Humber of Flights 0 Duration	of Flight, Days 0
OBJECTIVE DETERMINE THE FEASIBILITY, CHARACTERISTIC, CONSTRAINTS, AND INTERFACES OF PROPULSION SYSTEMS REQUIRED FOR CONTROLLED ACCELERATION OF SPACE SYSTEMS AND CORRELATE THE GROUND AND SPACE CHARACTERISTICS OF CAMBIDATE CONCEPTS.	
DESCRIPTION CAMBIDATE LOW THRUST PROPULSION CONCEPTS WILL BE ATTACHED TO THE SPACE STATION OR ASSOCIATED AND CONSTRAINTS ON THEIR USE TO CONTROL ACCELERATIONS INDUCED BY HATURAL AND SPACE SYST ASSOCIATED DIAGNOSTICS WILL ASSESS PLUME CHARACTERISTICS UNICH CANNOT BE ADEQUATELY EVA TESTS. THE PERFORMANCE AND LIFETIME WILL BE EVALUATED BY THE USE OF FLIGHT AND POST FLI CORRELATE SPACE AND GROUND RESULTS. THE SPECIFIC PROPULSION CONCEPTS TO BE EVALUATED AR INCLUDE RESISTOJETS OPERATED (1) IN SEVERAL MODES WHICH AFFECT THEIR DYNAMIC THRUST CHARACTERISTICS WHICH AFFECT THEIR DYNAMIC THRUST CHARACTERISTICS.	THE FEASIBILITY OF THE FORCES AND TORQUES LLUATED IN GROUPD GOT THE TORQUES TO TH
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) No Apogce, km Perigee, km Tolerance + - Inclination, deg Any Tolerance + - Nodal Angle, deg Any Ephemeris Accuracy, m	JALITY IS
POLITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Field of View (deg) Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
Power, U Duration, Mrs/Day Operating 0 0.00 Standby 0 0.00 () Continuous Post 0 0.00	

0

Conitoring Requirements: () Hone () Encription/Decription R () Uplink Required: Comma	equired		Frequency (111z	0.00			
On-Board Data Processin Description: Data Types: () Analo Film (Amount): Live TV (Hours/Day):	g () Digital		Nours/Day Voice (Nours/D Other:	0.00 0.00			
Live TV (Hours/Day): On-Loard Storage (Hbit) Data Dump Frequency (Pe Recording Rate (KBPS)	: 0.00 r Orbit) 0 0.00		Dovmlink çomaa Dovmlink Frequ		0.00		
Heat Rejection, W On	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	0 0	Haximua Haxiaum Haxiaum Haxiaum	0 0 0			
QUIPPENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch wass, Consumable T	TICS () External (X) Pressurized 0.00 meters Width: 0.00 meters Width:	0.00 0.00 Retur	mpressurized meters meters mass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POO
QUIPMENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	TICS () External (X) Pressurized 0.00 meters Width: 0.00 meters Width: ypes	() U 0.00 0.00 Retur	mpressurized meters meters mass, kg:	Height:			OF POOR Q
CUIPMENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Launch mass, Consumable T Acceleration	TICS () External (x) Pressurized 0.00 meters Width: kg: ypes Sensitivity, (g)	() U 0.00 0.00 Retur	mpressurized meters meters mass, kg:	Height:			OF POOR QUAL
CUIPMENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0	TICS () External (x) Pressurized 0.00 meters Width: 0.00 meters Width: ypes Sensitivity, (g)	() U 0.00 0.00 Retur	mpressurized meters meters mass, kg:	Height:			OF POOR QUALITY
CUIPMENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0	TICS () External (X) Pressurized 0.00 meters Width: 0.00 meters Width: kg: 0 ypes Sensitivity, (g) Task Assignments Skill	() U 0.00 0.00 Retur	mpressurized meters meters mass, kg:	Height:			OF POOR QUALITY
QUIPPENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0	TICS () External (x) Pressurized 0.00 meters Width: 0.00 meters Width: ypes Sensitivity, (g) Task Assignments Skill Level	() U 0.00 0.00 Retur	mpressurized meters meters mass, kg:				OF POOR QUALITY
EQUIPMENT PHYSICAL CHAPACTERIS Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration CREW REQUIREMENTS Crew Size 0 Skills (See Table B)	TICS () External (x) Pressurized 0.00 meters Width: 0.00 meters Width: yes Sensitivity, (g) Task Assignments Skill Level	() U 0.00 0.00 Retur	npressurized meters meters neters neters neters letero letero lours/EVA Consumabl Han hours				OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions REJECT

PAYLOAD ELEMENT HAME TELEOPERATOR REAL TIME COIN: CONTACT Home JAMES E. RAMDOLPH M/S 156-220 Address JPL 4300 OAK GROVE DR. PASADERA, CA 91109		TYPE Science and Application	aent
Telephone (213) 354-2732 STATUS () Operational () Approved () Planned () Candidate		Importance of the Space this Element 1 = Low Value, But Cou 10 = Vital Scale = 0	e Station to uld Use
Desired First Flight, Year: 0 Number of Flight	s 0 Duration	of Flight, Days 0	
CEJECTIVE THIS EXPERIMENT WOULD EVALUATE THE PERFORMANCE OF A HAM IN C SITUATION TAKING INTO CONSIDERATION THE EFFECTS OF TIME DELA DATA COMPRESSION, ETC. IT WILL DETERMINE ACCEPTABLE LEVELS O DATA COMPRESSION AND COULD LEAD TO A LARGE "TELEPRESENCE" EX THICLUDING ADAPTIVE AUTOMATED CONTROL CONCEPTS.	OF VIDEO		ORIGIN OF PC
THE EXPERIMENT COULD BE A PART OF A LARGER "TELEPRESENCE" EXECUTIVE, IMM-IN-THE-LOOP CONTROL OF FREE-FLYERS, FROM THE ACCESS" PELLOSOPHY OF TORSS IS NOT COMPATIBLE UITH MANY OF CONTROL APPLICATION. DIRECT RF LINKS, WITH AN ASSOCIATED RF	CDACE CTATTON THE CHEPENT	thair grate	ORIGINAL PAGE IS
ORBIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, km Inclination, deg Required, m/s Capable, decomposited, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, m		
POINTING/OKIENTATION View Direction () Inertial () Solar Truth Sites (if known) Pointing Accuracy, arc-sec 0.00	() Earth (X) Any Field of Vicw (deg)		
Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)			

() Encription/Decription () Uplink Required: Common On-Doord Data Processi	Required (KBS): 0 ng Required		Frequency (1112	0.00			
Data Types: () Anal Film (Amount): Live TV (Hours/Day):	og () Digital		Hours/Day Voice (Hours/Day Other:	ay): 0.00			
Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit): Data Dump Frequency (Per Orbit) Recording Rate (KBPS) THEREAL (X) Active () Passive Temperature, des C. Operational Minimum 0 Voice (Hours/Day): O.00 Downlink command rate: Downlink Frequency (EMz):					0.00		
(X) Active () Passive		0 0 0		0 0 0			
Equipment ID/Function Length: Length: Launch nass Consumable	0.00 meters Width 0.00 meters Width kg: 0	0.00 0.00 Return	Remote Unpressurized Inters	Neight: Neight: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	OF POOR
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	0.00 meters Width 0.00 meters Width Vidth	0.00 0.00 Return	neters neters n mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUAL
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio	0.00 meters Width 0.00 meters Width 0.00 meters Width 1. kg: Types on Sensitivity, (g)	0.00 0.00 Return	neters neters n mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio CREU REQUIREMENTS Crew Size 0	(%) Pressurized 0.00 meters Width 0.00 meters Width 0.kg: 0 Types on Sensitivity, (g) Task Assignments	0.00 0.00 Return	neters neters n mass, kg:	Height:		(Stowed) (Deployed)	OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio CREM REQUIREMENTS Crew Size 0	(%) Pressurized 0.00 meters Width 0.00 meters Width fyes on Sensitivity, (g) Task Assignments Skill	0.00 0.00 Return	neters neters n mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass Consumable Acceleratio CREW REQUIREMENTS Crew Size 0	(%) Pressurized 0.00 meters Width 0.00 meters Width 1, kg: Types on Sensitivity, (g) Task Assignments Skill Level	0.00 0.00 Return	neters neters n mass, kg:			(Stoved) (Deployed)	OF POOR QUALITY
Length: Length: Length: Launch mass Consumable Acceleratio CREU REQUIREMENTS Crev Size 0 Skills (See Table E)	(%) Pressurized 0.00 meters Width 0.00 meters Width 0.05 kg: 0 Types on Sensitivity, (g) Task Assignments Skill Level Hours/Day	0.00 0.00 Return	Dieters Dieter			(Stoved) (Deployed)	OF POOR QUALITY

SPECIAL CONSIDERATIONS/See instructions REJECT.

PAYLOAD ELEBRIT HARE LARGE ANTERNA DEVELOPMENT CONTACT Name NAL. GRANTHAN Address LANGLEY CONTACT	TYPE Science and Applications (Non-comm.) Commercial
Telephone STATUS	10 = Vital
() Operational () Approved () Planned () Candidate (X) Opportunity Desired First Flight, Year: 0 Number of Flights 0 Duratio	Scale = 0 on of Flight, Days 0
OEJECTIVE PROVE CHARLING TECHNOLOGIES ASSOCIATED WITH SHORT AND LONG BASELINE LSA RECEIVER SYSTEM DESIGNS SUITABLE FOR RADIO ASTRONOMY AND SEARCH AND RESCUE USE.	
DESCRIPTION SHORT BASELINE - UTILIZE EXTREME ENDS OF SPACE STATION AS BASELINE SEPARATION OF INTE LONG BASELINE - UTILIZE SPACE STATION AND FREE FLYER. HIGHOUAVE RECEIVERS AND ANTENNAS WOULD BE IMPLEMENTED FOR ORBITAL OPERATION WITH ANTE LENGTHS UP TO 500 FT. KHOWN EARTH AND GALACTIC TARGETS WOULD BE USED TO EVALUATE SYTS	DINA BASELINE
PERFORMANCE.	SEM DESIGNS AND ORIGINAL POOR P
OREIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) Ho Aporce, kn Tolerance + Inclination, deg Any Hodal Angle, deg Any Escape dV Required, m/s	PAGE IS
POINTING/OLIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Postrictions (Avoidance)	
POUCK) AC () DC Pover, W Duration, Mrs/Day	
Operating 8 8:00 (E) Continuous	

(

Peak Voltage, V	0	0.0 Frequency,		0					
() On-Board Dal	rements: () Realting lecription red: Communication Commun	Required (KBS):	() Other 0		quency (171	z): 0.0	0		
Description Data Types: Film (Amount Live TV (Hou On-Board Sto Data Dump Pr Recording Ra	:): () Anal rs/Day): prage (libi	0.00		Oth	rs/Day ce (Hours/ er: mlink comm mlink Freq	Day): 0:8			
THERIAL (X) Active Temperature Neat Reject		e Operational Minimum Non-operational Mini Operational Minimum Non-operational Mini	aun aun	0 0 0	Haximum Haximum Haximum Haximum	0 0 0		•	
Equipment ID/Fu	Dinternation Length: L	0.00 meters 0.00 meters 0.00 meters s, kg:	macn.	0.00 me	essurized ters ters ass, kg:	Height: Height:	0.00 meters 0.00 meters	(Stoved) (Deployed)	OF POOR QUALITY
CREU REQUIREMENTS Crev Size	0	Task Assigmaen	ts						PAG
Skills (See Tab	le B)	Skill	- 1	1	1	1 1	1		500
		Level	- 1	ı	ı	1 . 1	1		< 100
		Hours/Day	1	1	1	1 1	ī		
EVA () Yes	(x) No	Reason			Hours/EV	Λ 0.00			
SERVICING/NAINTERAN Service:	ICE	Interval Returnables Interval		0 days 0 kg 0 days	Consumab	les s required s Required	8:88 1:g		

SPECIAL CONSIDERATIONS/See instructions

DAVIOUS TO RELEVES MANY	67V1323
PAYLOAD ELEMENT MAKE THE OF LIGHTURIGHT CRYO HEAT PIP EACK2054 CONTACT Hame CHARLES J. CAMARDA Address	Commercial (X) Technology Development (Bon-commercial (Commercial
Telephone STATUS () Operational () Approved () Planned () Candidate (%) Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
	ration of Flight, Days 0
DESCRIPTION THE PURPOSE OF THE HISSION IS TO INVESTIGATE FABRICATION METHODS FOR MANUFACTURE LARGE LIGHTWEIGHT CRYOGENIC HEAT PIPES. TOWARD THIS END, SEVERAL TYPES OF WORKING CONFIGURATIONS, FARRICATION TECHNIQUES AND CLEANING AND PROCESSING PROCEDURESSHO OF REAT-PIPE CONFIGURATIONS HIGHT VARY FROM A STUPLE CYLINDRICAL CONFIGURATION TO ESTAT PLATE SANDWICH PANEL OR A VARIABLE CONDUCTANCE HEAT PIPE, FABRICATION DOUBLING OR WELDTING COULD BE INVESTIGATED TOCETHER WITH CLEANING, FLUID CHARGNG, SEVERAL HEAT PIPES UTLL BE FABRICATED AND TESTED IN SPACE AND THEIR PERFORMANCE EE TIPOSSIBLE SINCE THE DESIGNS WILL BE ULTRALIGHTWEIGHT AND NOT CAPABLE OF CONT	G FLUIDS, HEAT-PIPE ULD BE INVESTIGATED. TYPES O MORE COMPLEX DESIGNS SUCH TECHNIQUES SUCH AS DIFFUSION
PRESSURES OF THE CRYOCENIC WORKING FLUIDS AT AMBIENT TEMPERATURE. CREIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) No Apogee, lan Perigee, lan Tolerance + Inclination, deg Any Nodal Angle, deg Any Escape dV Required, m/s	PAGE
POTHTTHC/ORTENTATION) Any
POWER () AC Power, U Duration, Nrs/Day Operating 0 0.00 Ctandby 0 0.00 Peck 0 0.00 Voltage, V 0 Frequency, Nz 0	

Monitoring Requirements: () Hone () Realtime () Encription/Decription R () Uplink Required: Comma On-Board Data Processin Description:	equired	Other:	Frequency (IMz	0.00			
Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit)	g () Digital		Hours/Day Voice (Hours/D Other:	ny): 0.00			
On-Board Storage (Hbit) Data Dump Frequency (Pe Recording Rate (KBPS)	: 0.00 r Orbit) 0 0.00		Downlink comma Downlink Frequ		0.00		
MERIAL (X) Active () Passive Temperature, deg C Op No Neat Rejection, W Op No	erational Hinimum n-operational Hinimum erational Hinimum n-operational Hinimum	8	Maxiruun Maxiruun Maxiruun Maxiruun	8			
Equipment ID/Function Length: Length: Launch mass, Consumable T	0.00 meters Wid 0.00 meters Wid kg: Wid	th: 0.0	Remote Unpressurized 00 meters 00 meters urn mass, kg: .00E+00 max:	Reight: Reight: 0.00E+00	0.00 meters 0.00 meters	(Stoved) (Deployed)	OF POOR
Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	0.00 meters Wid 0.00 meters Wid kg: 0	th: 0.0	00 meters 00 meters urn mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUA
Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration	(X) Pressuriz 0.00 meters Wid 0.00 meters Wid kg: ypes Sensitivity, (g)	th: 0.0	00 meters 00 meters urn mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALIT
Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0	(X) Pressuriz 0.00 meters Wid 0.00 meters Wid kg: ypes Sensitivity, (g) Task Assignments	th: 0.0	00 meters 00 meters urn mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration EM REQUIREMENTS Crev Size 0	(X) Pressuriz 0.00 meters Wid 0.00 meters Wid kg: 0 ypes Sensitivity, (g) Task Assignments Skill	th: 0.0	00 meters 00 meters urn mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALITY
Equipment ID/Function Length: Length: Launch mass, Consumable T Acceleration REU REQUIREMENTS Crew Size 0	(X) Pressuriz 0.00 meters Wid 0.00 meters Wid kg: ypes Sensitivity, (g) Task Assignments Skill	th: 0.0	00 meters 00 meters urn mass, kg:	Height:		(Stoved) (Deployed)	OF POOR QUALITY
Length: Length: Launch wass, Consumable T Acceleration REW REQUIREMENTS Crew Size 0 Skills (See Table E)	(X) Pressuriz 0.00 meters Wid 0.00 meters Wid kg: 0 ypes Sensitivity, (g) Task Assignments Skill Level Hours/Day	th: 0.0	Of meters Do met			(Stoved) (Deployed)	OF POOR QUALITY

SPECIAL CONSIDERATIONS/Sec instructions REJECT.

PAYLOAD ELEMENT HAIR: CODE ADV ADAPTIVE COUTROL TECH DELO BACK2055	TYPE Science and Applications (Non-comm.) Commercial
CONTACT Home L.W. TAYLOR, JR Address LANGLEY CONTACT	(X) Technology Development () Operations () Other () National Security Type number (see table A) 0
Telephone ·	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 0
Desired First Flight, Year: 0 Number of Flights 0 Duration	of Flight, Days 0
OF JECTIVE EVALUATE ADAPTIVE CONTROL TECHNIQUES REQUIRED BY ADVANCED SPACE STATION CONFIGURATIONS. THESE ADAPTIVE CONTROL TECHNIQUES WILL INCLUDE CLOSED-LOOP SYSTEMS IDENTIFICATION.	
DESCRIPTION ADVANCED ADAPTIVE CONTROL LAWS WILL BE PROVIDED AS SELECTABLE ALTERNATIVES TO OPERATION VARIOUS ADVANCED TECHNIQUES WILL BE EVALUATED WITH THE OPERATIONAL SYTEM SERVING AS A RECORD OF THE OPERATION	OF POOR
ORDIT CHARACTERISTICS. Geosynchronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + - Inclination, deg. Any Hodal Angle, deg. Any Escape dv Required, m/s	QUALITY IS
POINTING/ORIENTATION View Direction: () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.06 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	
Operating 0 0.00 Standby 6 0.00 (E) Continuous Peak Voltage, V 0 Frequency, Hz 0	

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() Encription/Decription R. () Uplink Required: Command On-Board Data Processing Description:		0		equency (1711z				
Data Types: () Analog Film (Amount): Live TV (Lours/Day): On-Board Storage (Hbit)	0	1	Vo	urs/Day ice (Nours/D her:	ay): 0.00			
Data Dump Frequency (Per Recording Rate (KEPS)	r Orbit) 0 0.00			omlink comma omlink Frequ		0.00		
Heat Rejection, W Ope	erational Miniau n-operational Mi erational Miniau n-operational Mi	nimum	0 0 0 0	liaximum Maximum Maximum Maximum	0 0 0			
				THE RES AND RES AND RES AND RES THE RES AND REST				
COULDISM:T PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T	(X) Pres 0.00 meters 0.00 meters kg:	Width: Width:	0.00 m 0.00 m Return	ressurized eters eters mass, kg:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)	ORIGINAL PA
CULPERT PHYSICAL CHARACTERIST Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable TyAcceleration	(X) Pres 0.00 meters 0.00 meters kg: ypes	Width: Width:	() Unp 0.00 m 0.00 m Return	ressurized eters eters mass, kg:	Height:		(Stowed) (Deployed)	OF POOR QUALIT
CUIPMENT PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable Ty Acceleration	(X) Pres 0.00 meters 0.00 meters kg: ypes Sensitivity, (g	Width: Width:	() Unp 0.00 m 0.00 m Return	ressurized eters eters mass, kg:	Height:		(Stowed) (Deployed)	ORIGINAL PAGE IS
QUIPLEMET PHYSICAL (CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable Tacceleration Crew Size ()	(X) Pres 0.00 meters 0.00 meters kg: ypes Sensitivity, (g	Width: Width:	() Unp 0.00 m 0.00 m Return	ressurized eters eters mass, kg:	Height:		(Stowed) (Deployed)	ORIGINAL PAGE IS
CUIPMENT PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable To Acceleration CREW REQUIREMENTS Crew Size ()	(X) Pres 0.00 meters 0.00 meters kg: ypes Sensitivity, (g Task Assignm	Width: Width: in the second of the second o	() Unp 0.00 m 0.00 m Return	ressurized eters eters mass, kg:	Height:		(Stowed) (Deployed)	ORIGINAL PAGE IS
QUIPLEMET PHYSICAL (CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable Tacceleration Crew Size ()	(X) Pres 0.00 meters 0.00 meters kg: ypes Sensitivity, (g Task Assignm Skill Level	Width: Width: in the second of the second o	() Unp 0.00 m 0.00 m Return	ressurized eters eters mass, kg:	0.00E+00		(Stowed) (Deployed)	OF POOR QUALITY
EQUIPMENT PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable To Acceleration CREM REQUIREMENTS Crew Size 0 Skills (See Table B)	(X) Pres 0.00 meters 0.00 meters kg: ypes Sensitivity, (g Task Assignm Skill Level Hours/Day	Width: Width: in the second of the second o	() Unp 0.00 m 0.00 m Return	ressurized eters eters eters hass, kg: +00 max:	0.00E+00 1		(Stowed) (Deployed)	OF POOR QUALITY

PEJECT.

PAYLOAD FLEIBRIT HATE SOLAR PUMPED LASERS CODE EACK2056	TYPE Science and Applications (Non-comm.)
CONTACT Hame Address HASA LANGLEY RESEARCH CE	(%) Technology Development () Operations () Other () National Security Type number (see table A) 16
Telephone	Importance of the Space Station to this Element 1 = Low Value, But Could Use
STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	10 = Vital Scale = 1
Desired First Flight, Year: 1996 Humber of Flights 0 Duration	of Flight, Days 0
OBJECTIVE TO DESCRIPTE, CALIERATE, AND TEST THE OPERATION OF A OPTICAL CONCENTRATOR. TO PROVIDE A REALISTIC COMPARISON OF SEVERAL SOLAR LASER TYPES.	
	OF THE
DESCRIPTION THE HISSION WILL DEPONSTRATE FOR THE FIRST TIME SOLAR-PUNPED LASING USING THE FULL SOL THAN A SITULATED SPECTRUM). IT WILL PROVIDE FOR THE ACCURATE MEASUREMENT OF SOLAR LASE SPECTRUM AND TEMPERATURE-DEPENDENT AND WILL PROVIDE FOR LONG-TERM OPERATION TO ASSESS STABILITY AND LASANT RECONSTITUTION EFFICIENCY. AN ASSESSMENT OF CONVERTER PERFORMANCE FOR LONG-TERM OPERATION AND RESISTANCE TO ENVIRONMENTAL INTERFERENCE OR DEGRADATION WILL SIT OF CONVERTORS. THE MISSION WILL BE THE FIRST SYSTEMS-LEVEL TEST OF LASER PROPULSIO THRUST AND SPECIFIC IMPULSE AS WELL AS SYSTEM CHARACTERISTICS SUCH AS STEADY-STATE WAL	R EFFICIENCY UNICH IS LASAUT LASAUT LEFFICIENCY, STABILIT LL BE PERFORMED FOR A
OREIT CHARACTERISTICS Ceosynchronous Orbit () Yes (X) No Apogee, km 500 Perigee, km 500 Tolerance + - Inclination, deg 28.5 Tolerance + - Lodal Angle, deg Any Ephemeris Accuracy, m	
POINTING/ORIENTATION View Direction Truth Sites (if known) Pointing Accuracy, arc-sec 0.06 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance) POINTING/ORIENTATION (X) Solar (X) Earth (Y) Any Field of View (deg)	
POULER () AC (X) BC Power, U Duration, Hrs/Day Operating 1060 12.00 Standby 0 0.00 (X) Continuous	
Standby 0 0.00 (E) Continuous Peak 0 0.00 Voltage, V 0 Frequency, Hz 0	

Conitoring Requirements: (A) Realtime (A) Recaltime (B) Encription/Decription I (B) Uplink Required: Comma (C) On-Coard Data Processing	Required	Other:	Frequency (IMz): 0.00			
Data Types: () Analo Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit)	0		Hours/Day Voice (Hours/D Other:	0.00 0.00			
Data Dump Frequency (Po Recording Rate (KEPS)	or Orbit) 0 0.00		Downlink comma Downlink Frequ		0.00		
TIEMAL (X) Active () Passive Temperature, deg C O Heat Rejection, V O	perational Minimum on-operational Minimum perational Minimum on-operational Minimum	0 0 0	Maximum Maximum Maximum Maximum	0 0 0 0			
Equipment ID/Function Length: Length: Launch mass Consumable	6.00 meters Wid 6.00 meters Wid 6.00 meters Wid kg:	th: 1.	Remote Unpressurized 00 meters 00 meters urn mass, k2600 .00E+00 max:	Height: Height:	1.00 meters 1.00 meters	(Stowed) (Deployed)	
Equipment ID/Function Length: Length: Launch mass Consumable Acceleration	6.00 meters Wid 6.00 meters Wid 6.00 meters Wid kg: 99	th: 1.	00 meters 00 meters urn mass, k2600	Height:			
Equipment ID/Function Length: Length: Launch mass Consumable Acceleration	() Pressuriz 6.00 meters Wid 6.00 meters Wid 6.05 kg: 199 Types 6 Sensitivity, (g)	th: 1.	00 meters 00 meters urn mass, k2600	Height:			00
Equipment ID/Function Length: Length: Launch mass Consumable Acceleration CREW REQUIREMENTS Crew Size 1	() Pressuriz 6.00 meters Wid 6.00 meters Wid 6.05 Fypes 6 Sensitivity, (g) Task Assignments	th: 1.	00 meters 00 meters urn mass, k2600	Height:			ORIG OF P
Equipment ID/Function Length: Length: Launch mass Consumable Acceleration REW REQUIREMENTS Crew Size 1	() Pressuriz 6.00 meters Wid 6.00 meters Wid 7 kg: 99 Types a Sensitivity, (g) Task Assignments Skill 3	th: 1.	00 meters 00 meters urn mass, k2600	Height:			
Equipment ID/Function Length: Length: Launch mass Consumable Acceleration REW REQUIREMENTS Crew Size 1	() Pressuriz 6.00 meters Wid 6.00 meters Wid 6.00 seters Wid 6.00 seters Wid 6.00 seters Wid 79 Sensitivity, (g) Task Assignments Skill 3	th: 1. Ret win: 0	00 meters 00 meters urn mass, k2600	0.00E+00			OF POOR
Length: Length: Length: Launch mass Consumable Acceleration CREM REQUIREMENTS Crew Size 1 Ckills (See Table B)	() Pressuriz 6.00 meters Wid 6.00 meters Wid 6.00 meters Wid 7 kg: 7 ypes 7 Sensitivity, (g) Task Assignments Skill 3 Level 3 Hours/Day 4	th: 1. Ret win: 0	00 meters 00 meters urn mass, k2600 .00E+00 max:				

SPECIAL CONSIDERATIONS/Sec instructions

		I	Coeing-Specific I	nput Data			
IISSICH TYPE		OPS CODE					
Free Flyer () Not Serviced () Remote THS () Remote Hanned () Serviced at Stati () Serviced at Stati	on (THS Retrieve on (Self-propell	FT FH. ed) FST					
Platform Based () Hot Serviced () Remote ThS Remote Hanned Serviced at Stati () Serviced at Stati	on (THS Retrieve on (Self-propell	P PT PM PST Led) PS					
Other Space Station Bas Sortie	ed	SS SOR					99
CONSTRUCTION/SERVICING C	OHPLEXITY						OF POOR
Operations Times OTV Up/Down OTV or The on Orbit Lission Use IVA Service EVA Service EMA Service EMA Friment Ops Service Frequency	nan-	days/year days/year days/year days/year es/year					QUALITY
Delta Velocities Up Lorm Lero Return	0.00 8:88						
Eupport Equipment Length: Length:	8:88 meters	Width:	8:00 meters	Height:	8:00 meters	(Stoyed) (Deployed)	
Mass:	0 kg						
Canifest Restrictions (X) No Restrictions () Cally with compati () Fly-Alone () Nust have Docking	ble payloads Nodule						
Length of Pean Fab Durber of Appendages Lamber of Locules Lequir	ed to Assemble (the Payload	0.00				

- - - PRICE 84 - -ELECTRONIC ITEM

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TIME 18:55 (283016) FILENAME: REID2.DAT

SOLAR PUMPED LASER

	U	NIT WEIGHT	220.00	MODE
PROTOTYPE QUANTITY	3.000 UM	VIT VOLUME	152.00	QUANTITY/NHA
PROGRAM COST(\$ 1000)	DEVELOPMEN	NT . FR	овисттон	TOTAL COST
ENGINEERING				
DRAFTING .	66.			óć.
DESIGN	164.		-	184.
SYSTEMS	19.			19.
PROJECT MGMT	346.		-	346.
DATA	34.		-	34.
SUBTOTAL (ENG)	650.			á50.
MANUFACTURING				
PRODUCTION			-	
PROTOTYPE	1322.		-	1302.
TOOL-TEST EQ	575.		-	575.
SUBTOTAL (MFG)	1897.		-	1897.
TOTAL COST	2548.		-	2548.

OF POOR QUALITY

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DATE 4-MAR-83

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		,	4141			
DLAR PUMPEL LASER						
			WEIGHT	*** **	4000	
				220.00		
PAGIGTYPE QUANTIT	Y 3.000	UNIT	VOLUME	162.00	QUANTITY	ZNHA
			*,			
PROGRAM COST(. 100	0) DEVEL	OPHENT	PRO	NOTTON	TOTAL	COST
INGINEERING						
DRAFTING		66.				
DESIGN		184.				ó.
						4.
SYSTEMS		17.				9.
FROJECT MONT		346.				٥.
DATA		34.			3	4.
SUBTOTAL(E	NG)	650.		-	55	0.
MANUFACTURING						
FRODUCTION						•
PROTOTYPE		322.		•	132	
TOOL-TEST EG		375.			57	
SUBTOTAL (M	FG) 1	397.		•	137	7.
TOTAL COST	2	548.			254	a.
CESION FACTORS	ELECTRONIC ME	CHANTCAL	penn	ICT DESC		
WEIGHT		15.000			G COMPLEXITY	
DENSITY	41.500					
		1.327*		TOTYPE		1.0
HFG. COMPLEXITY	10.313	7.640			DULE FACTOR	.220*
NEW DESIGN	0.000	0.200			FRACTION	.001#
DESIGN REPEAT	0.000	0.000	FLI	ATFORM		2.500
EGUIPMENT CLASS		****	YE	AR OF TE	CHNOLOGY	1987*
INTEGRATION LEVEL	L 0.0	0.0	REL	IABILIT	Y FACTOR	1.0
				FIFIELD		1211464
3CHEDULE	START		SST ITEM			
					FINISH	
DEVELOPMENT	JAN 87 (7) 10	L 87*	9)	APR 38+	(10)
SUPPLEMENTAL INFORM	MOITAM					
EAR OF ECONOMICS	1984		TOOL	NG 1 PR	OCESS FACTOR	5
ESCALATION	0.00				T TOOLING	2.00
DEV COST MULTIFLE						3.00
CLET RANGES	DEVELO	MENT	PRODU	еттон	TOTAL C	nat
FROM		05.		-	2205	
- CENIER		48.			2548	
10		26.			2925	

PAYLOAD ELEMENT MAKE PROC TECH-PROC & TECH EACX2057 CONTACT Name No Deliei Address Johnson Space Center	TYPE Science and Applications (Hon-comm.) Commercial X Technology Development Operations Other Hational Security Type number (see table A) 0
Telephone STATUS () Operational () Approved () Planned () Candidate (X) Opportunity	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital Scale = 0
	ration of Flight, Days 0
OBJECTIVE TO PROVIDE A SCIENTIFIC AND TECHNOLOGICAL BASE FOR OPTIMIZING THE MAN LACULUS HIX FOR EXPEDITIOUSLY TRANSFORMING NATERIALS PROCESSING PHENOLERA IN LOW G ENVIRONMENT INTO COMMERCIALLY VIABLE PRODUCT LINES.	
DESCRIPTION SHE CONNERCIAL #BACK1005 AND BACK1006	ORIGINAL PAGE IS
ORBIT CHARACTERISTICS. Geosyachronous Orbit () Yes (X) No Apogee, km Perigee, km Tolerance + Inclination, deg Any Rodal Angle, deg Any Escape dV Required, m/s	
POINTINC/ORIENTATION View Direction () Inertial () Solar () Earth (X Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special Restrictions (Avoidance)	Any
POWER (E) AC (E) DC Power, W Duration, Hrs/Day Operating 0 0.00 Standby 0 0.00 (E) Continuous Pock 0 0.00 Voltage, V 0 Frequency, Hz 0	

Houitoring Requirements: () Hone () Realtime () Encription/Decription Re	() Offline () Other equired and Rate (KES): 0		Frequency (IIIz	0.00			
() Encription/Decription Rd () Uplink Required: Common () On-Board Data Processing Description:	g Required		rrequency (maz	. 0.00			
Pata Types: () Analog Film (Amount): Live TV (Hours/Day): On-Board Storage (Hbit)	g () Digital		Nours/Day Voice (Nours/Da Other:	0.00 0.00			
Data Dump Frequency (Per Recording Rate (KBPS)	orbit) 0 0.00		Downlink comma Downlink Frequ		0.00		
MERIAL (%) Active () Passive							
Temperature dec C On	erational Minimum n-operational Minimum erational Minimum n-operational Minimum	0 0	Haximum Haximum Haximum Haximum	0 0 0		•	
	TICS						
QUIPTERT PRYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable T	TICS () External (x) Pressurized 0.00 meters	0.00 0.00 Retur	emote npressurized meters meters n mass, kg: 0E+00 max:	Height: Height: 0.00E+00	0.00 meters 0.00 meters	(Stoved) (Deployed)	99
CUIPLEHT PHYSICAL CHARACTERIS' Location Internal Equipment ID/Function Length: Length: Launch Mass, Consumable T Acceleration	TICS () External (x) Pressurized 0.00 meters Width: 0.00 meters Width:	0.00 0.00 Retur	mpressurized meters meters n mass, kg:	Height:			ORIGIN OF PO
CUIPTERT PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable Tacceleration	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: cypes Sensitivity, (g)	0.00 0.00 Retur	mpressurized meters meters n mass, kg:	Height:			POOR
CUIPLEHT PHYSICAL (CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable Tacceleration PEU REQUIREMENTS Crew Size ()	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: 0 types Sensitivity, (g) Task Assignments	0.00 0.00 Retur	mpressurized meters meters n mass, kg:	Height:			POOR
CULPTENT PHYSICAL CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable T Acceleration CLU REQUIREMENTS Crew Size 0	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: 0 ypes Sensitivity, (g) Task Assignments Skill	0.00 0.00 Retur	mpressurized meters meters n mass, kg:	Height:			POOR
CUIPLEHT PHYSICAL (CHARACTERIS' Location () Internal Equipment ID/Function Length: Launch mass, Consumable Tacceleration PEU REQUIREMENTS Crew Size ()	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: cypes Sensitivity, (g) Task Assignments Skill Level	0.00 0.00 Retur	mpressurized meters meters n mass, kg:				POOR
EQUIPTERT PHYSICAL (CHARACTERIS' Location () Internal Equipment ID/Function Length: Length: Launch mass, Consumable TAcceleration CREM REQUIREMENTS Crew Size () Skills (See Table B)	TICS (x) External (x) Pressurized 0.00 meters Width: 0.00 meters Width: kg: Oypes Sensitivity, (g) Task Assignments Skill Level Hours/Day	0.00 0.00 Retur	npressurized meters meters n mass, kg: OE+00 max:	lleight: 0.00E+00 0.00 es required			

SPECIAL CONSIDERATIONS/See instructions

PAMLOAD ELEMENT MAIR; CODE ELECTROPI GRESTS SEPARATION BACK2058 CONTACT Name DAVID H. SUDDETH Address GODDARD SPACE FLIGHT CEN	TYPE Science and Applications (Non-comm.) Commercial X Technology Development Operations Other Hational Security Type number (see table A) 0
Telephone STATUS	Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
() Operational () Approved () Planned () Candidate (X) Opportunity Desired First Flight, Year: 0 Duration	Scale = 0 of Flight, Days 0
ORJECTIVE TO PROVIDE TECHNOLOGY DEVELOPMENT AND DEMONSTRATION OF IMPROVED METHODS OF SEPARATURG AND PURIFYING BIOLOGICAL, MEDICAL AND OTHER TYPES OF MATERIALS UNDER CONDITIONS OF VERY LOW (MILLI-G) GRAVITY.	
DESCRIPTION SEE CONNERCIAL & BACK1005	ORIGINAL OF POOR
ORBIT CHARACTERISTICS Geosynchronous Orbit () Yes (X) Ho Apogee, km Perigee, km Tolerance + Inclination, deg Any Kodal Angle, deg Any Escape dv Required, m/s	AL PAGE IS
POLITING/ORIENTATION View Direction () Inertial () Solar () Earth (X) Any Truth Sites (if known) Pointing Accuracy, arc-sec 0.00 Pointing Stability (Jitter), arc-sec/sec 0.00 Special restrictions (Avoidance)	
Cover, V Duration, Nrs/Day Coverting 0 0.00 (E) Continuous Conti	

Colicating Requirements: () Realt () Encription/Decription () Uplink Required: Colon-Eograf, Data Proces	n Required) Other: 0	Frequency (12	lz): 0.00		
Description: Data Types: () An Film (Amount): Live TV (Hours/Day): On-Board Storage (Ha Lata Dump Frequency Recording Late (KBPS	alog () Digital 0 ait): 8:88 (Per Orbit) 0		Hours/Day Voice (Hours, Other: Downlink com Downlink Fred	and rate:	0.00	
IBRIAL				ii		
(X) Active () Passi Temperature, deg C Heat Rejection, W	Ve Operational Minimum Mon-operational Minimum Operational Minimum Mon-operational Minimum	aura 0	Haximum Haximum Haximum Haximum	0 0 0		
MITPHETT PHYSICAL CHAPACTE	PISTICS					
Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat	0.00 meters U 0.00 meters U 0.00 meters U	idth: idth:	Remote Unpressurized 0.00 meters 0.00 meters Return mass, kg: 0.00E+00 mass	Height: Height: x: 0.00E+00	0.00 meters 0.00 meters	(Stowed) (Deployed)
Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat	(X) Pressur 0.00 meters 0.00 meters U ss, kg: e Types	idth: idth: B win:	() Unpressurized 0.00 meters 0.00 meters Return mass, kg:	Height:		
Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat	(X) Pressur 0.00 meters W 0.00 meters W ss, kg: 0 e Types ion Sensitivity, (g)	idth: idth: B win:	() Unpressurized 0.00 meters 0.00 meters Return mass, kg:	Height:		
Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat CREU REQUIREMENTS Crey Size 0	(%) Pressur 0.00 meters (%) 0.00 meters (%) ss, kg: 0 e Types ion Sensitivity, (g) Task Assignment	idth: idth: B win:	() Unpressurized 0.00 meters 0.00 meters Return mass, kg:	Height:		(Deployed)
Length: Length: Launch ma Consumabl Accelerat CREW REQUIREMENTS Crew Size 0	(X) Pressur 0.00 meters W 0.00 meters W ss, kg: 0 e Types ion Sensitivity, (g) Task Assignment Skill	idth: idth: B win:	() Unpressurized 0.00 meters 0.00 meters Return mass, kg:	Height:		(Deployed)
Equipment ID/Function Length: Length: Launch ma Consumabl Accelerat CREW REQUIREMENTS Crew Size 0	(X) Pressur 0.00 meters (V) 0.00 meters (V) 0.00 meters (V) e Types ion Sensitivity, (g) Task Assignment Skill Level	idth: idth: B win:	() Unpressurized 0.00 meters 0.00 meters Return mass, kg:	Height: x: 0.00E+00		

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COMMERCIAL FILLIO COMPACE MOCH PACASONS		TYPE
CRYOCERTO PLUYD STORAGE TECH EACK2062 CONTACT Home Address		Science and Applications (Non-comm.) Commercial (X) Technology Development () Operations () Other () National Security Type number (see table A) 16
Telephone STATUS		Importance of the Space Station to this Element 1 = Low Value, But Could Use 10 = Vital
() Operational () Approved () Planned (X) Candidate Desired First Flight, Year: Number of Flights		Scale = 6 of Flight, Days
OF JECTIVE TO DEVELOP THE TECHNOLOGY FOR ADVANCED INSULATION AND LONG LIBERTY OF THE TECHNOLOGY FOR ADVANCED INSULATION AND LONG LIBERTY CONTROL OF CRYOGENIC LIQUID STORAGE AND SUPPLY TANKS.	TAL.	
DESCRIPTION SUBSCALE CRYOGENIC FLUID STORAGE TANKS AND REFRIGERATION/LIQUESTORAGE, TRANSFER, REFRIGERATION, AND GAUGING PERFORMANCE. TO PECULREPENTS WILL ALSO BE INVESTIGATED. SELECTED CONCEPTS WILL CRYOGENIC FLUID STORAGE AND SUPPLY SYSTEMS FOR SPACE OPERATION.	JEFACTION SYSTEMS WOULD BE IERIAL STUDY STATES, AND I LL THEN PROVIDE DESIGN CRI	MINTAINABILITY TERIA FOR
		F POO
ORBIT CHARACTERISTICS Coosynchronous Orbit () Yes () Ho Apogee, km Perigee, km Inclination, deg Hodal Aggle, deg Escape dy Required, m/s	Tolerance + - Tolerance + - Ephemeris Accuracy, m	ORIGINAL PAGE IS
Apolee, km Perigee, km Inclination, des	Tolerance + -	F POOR QUALITY

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Data Dump Frequency (Pe Recording Rate (KEPS)	orbit) 0 0.00	Downlink command Downlink Frequence		0.00		
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Equipment ID/Function Length: Length: Launch mass Consumable of Acceleration CREW Size 0	(X) Pressurized 0.00 meters Uidth: 0.00 meters Vidth: kg: bypes Censitivity, (g) min Task Assignments Skill Level	() Unpressurized 0.00 meters He 0.00 meters He Return mass, kg:	eight:	0.00 meters 0.00 meters		OF POOR QUI
Length: Length: Length: Launch mass, Consumable of Acceleration CREW PROUREMENTS Crew Size 0 Skills (See Table E)	(X) Pressurized 0.00 meters Uidth: 0.00 meters Uidth: kg: types a Sensitivity, (g) min Task Assignments Skill Level Hours/Day	() Unpressurized 0.00 meters He 0.00 meters He Return mass, kg: 1	0.00E+00 I' I 0.00	0.00 meters 0.00 meters		OF POOR QUALITY

CTECIAL CONCIDENATIONS/See instructions

APPENDIX 1

SUMMARY OF STUDY TASKS AND FINAL REPORT TOPICAL CROSS REFERENCE

SUMMARY OF STUDY TASKS

The study accomplished 3 major objectives:

- Identified, collected, and analyzed science, applications, commercial, national security, technology development and space operations missions that require or benefit by the availability of a permanently manned space station. The space station attributes and characteristics that will be necessary to satisfy these requirements were identified.
- Identified alternative space station architectural concepts that would satisfy the user mission requirements.
- Performed programmatic analyses to define cost and schedule implications of the various architectural options.

Figure A-1 shows the summary task flow that was used to accomplish these objectives.

In Tasks 1.1 thru 1.5, missions were identified, screened, and their needs and benefits analyzed. Mission investigators were assigned to each of the mission classes (science and applications, commercial, technology development, space operations, and national security). In general, these investigators (and their supporting subcontractors) contacted potential users and analyzed available data to characterize potential mission needs. They worked in conjunction with designers and operations analysts to characterize the potential payloads and operational interfaces. In Task 1.6, the missions were allocated to orbits, and were assigned to platforms, free-flyers, or space stations, as appropriate. During Task 1.7, the various missions were integrated into time-phased mission models. The time-phasing took into account available budgetary constraints, prioritization, time sequencing constraints, and transportation availability. A computer program was used to process the integrated time-phased mission model to derive a year-by-year shuttle manifest schedule. The computer program was also used for Task 1.8 to derive the integrated time-phased space station accommodation requirements, i.e., power and thermal demands, berthing requirements, and crew skills. These mission analyses have been reported in Volume 2 of the final report.

Also included in Volume 2 are the results from Task 1.10. In this task, some of the primary commercial opportunities were examined to define the economics of the use of a space station and to define the benefits of doing business on a space station relative to doing it using the shuttle.

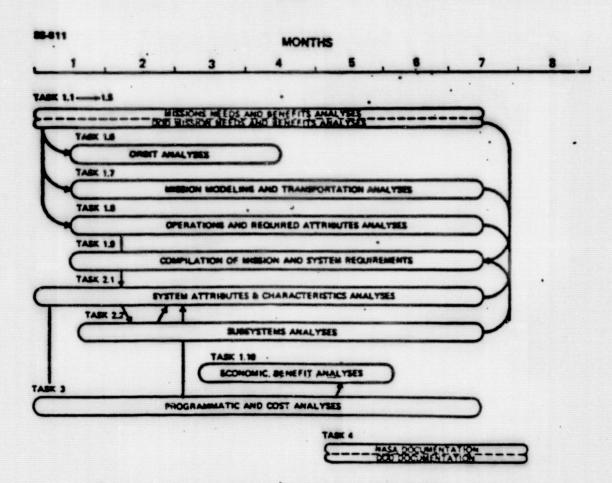


Figure A-1. Summary Diagram Outlines Major Task Traffic

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In Task 1.9, mission requirements and space station design requirements were identified. An aggregate of these requirements are reported in Volume 3.

Volume 4 of the final report contains the results from Tasks 2.1, 2.2 and 3. Specifically in Task 2.1, a methodology for defining realistic architectural options was established. This methodology was applied using the requirements defined in the previous tasks. From this, we have created 3 architectural options and have shown some reference space station configuration concepts for each architectural option. Task 2.2 was performed to obtain analysis and trades of some of the principle subsystems, i.e., data management, environmental control and life support, and habitability. Task 3 provides the analyses of programmatics and cost options associated with the concepts derived during the study.

A cross reference guide to enable locating study topics within the volumes and volume sections of the final report is presented in Table A-1.

TABLE A-I Final Report Topical Cross Reference Guide

Topic		Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm¹ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
Comm	nercial Missions											
	Communication Satellites	0	3.2.1				0		0			
	o Reconfigurable o Multibeam											
0	Materials Proc.	0	3.2.2		I-1.3.2.3, 1.2.2.1		0		0			
	Semiconductors Biological Glass Fibers											
0	Earth Observation		3.2.3									
Indust	rial Services		3.2.4						•			
	Crew Selection & Training In-Space OPS					,						
Techn	ology Demo's	o	3.3				0			0		
Space	Operation	0	3.4				0					
	Construction											

o Flight Support o Servicing

TABLE A-I
Final Report Topical Cross Reference Guide

Торі	c	Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
	nce & Applications ions											
0	Space Environment Missions	0	3.1.2				•	o				
o	Astrophysics Missions	0	3.1.3				0	o				
o	Earth Environment Missions	0	3.1.4				0	o ,	1			
0	Life Sciences Missions	0	3.1.5				•	o				
0	Materials Science Missions	0	3.1.6					o				
Сар	marios of Operational abilities Mission Constrained	•	4.0, 5.0				o					

- o Station Constrained
- o No Space Station

TABLE A-1
Final Report Topical Cross Reference Guide

Торі	c	Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-2 Mission Data Book
	sion Requirements mary		5.0									
Sum	mai y		5.0									0
0	Low Inclination Space Station	•	5.2,5.3	3.2.1	I-1.2.2.4		0					•
0	High Inclination Space Station	0	5.2,5.3		I-1.2.2.4		•					0
9	Platform only	0	5.4				0		1			o
0	Manifesting o Shuttle o OTV o TMS	0	5.2, 5.3, 5.4				0					•
0	Crew Size	•	5.2,5.3 5.4	3.2.1			•					•
۰	Crew Skills		5.2.5.3 3.1.2.5, 3.1.3.5, 3.1.4.5, 3.1.5.5, 3.2.1.5, 3.2.2.6, 3.2.3		II-2.2.3							
			3.2.3									

TABLE A-1
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Topic		Vol. I Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
Missio Summ	on Requirements ary (Continued)											
	Accommodations Regm'ts o Power	•	2.2 5.2,5.3 5.4	3.2.1 I-1.2.1.2, 1.2.2.4 1.2.3.3 1.2.3.4			0					•
	o Internal Vol o Berthing Ports its		6.0						1			
	Semiconductor Manufacturing	•	6.2	4			•					•
1 FT TO ESTABLISH PROPERTY AND A STATE OF	Glass Fiber Manufacturing	•	6.3				0					o
	Communications Satellite Assembly	0	6.4				,0					•
	Biological Materials Manufacturing	o	6.5				0					0

TABLE A-I
Final Report Topical Cross Reference Guide

Topi	c	Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
Miss	ion Analysis											
•	Manifesting Analysis Software	0	2.2				o					0
o	Accommodations & Crew Activity Analysis Software O Crew Skills	•	2.2				o					•
,	o Crew Size o Berthing Ports o Electrical power o Internal volume							•	`			
Desi	gn Requirements											
0	Mission Accommodation Reqm'ts		5.0	3.2								
•	Interfaces o Berthing/Docking Port				II-10.0 I-1.3.2.1						•	
	o Hangar		3.3		I-1.3.2.2							

TABLE A-I
Final Report Topical Cross Reference Guide

Торі	c	Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
Arch	hitectural Options											
0	Architecture Development Methodology	0			1-1.1		•				•	
0	Space Station Architectural Options	o			I-1.2		o				•	
,	Build-up and Growth	•	5.0		I-1.2.3.4, 1.3.1.3, 1.3.2.3, 1.3.3.3				•			
Data	Management											
0	Architecture				11-3.2						0	
0	In-FIt Checkout				11-3.3						0	
0	Space-Ground Integration				11-3.4						0	
0	Ground Lab				II-3.5						0	
0	Software Devel.				11-3.6						0	
0	Hardware Stds				11-3.7						0	
0	Software Stds				11-3.8						0	
0	Verif/Valid.				11-3.9						0	

TABLE A-1
Final Report Topical Cross Reference Guide

Topic	c	Vol. I Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
Logis	stics/Resupply											
0	Logistics Module				II-7.1, 7.3,7.4							
0	Resupply Reqm'ts				11-7.2							
and I	ronmental Control Life Support ystem				II-5.0						•	
0	ECLS Evolution				11-5.2.1,				1		•	
0	Safe Haven Logistics Module				5.3.2 II-5.2.1						0	
0					II-5.0,5.3	.2					0	
0					11-5.0,5.3	.2					0	
0	Performance and Loads Specification										0	
0	Overboard Venting				11-5.2.1,5	.2.2					0	
0	Architecture				II-5.2.1						0	
0	Water Recovery Syste	m			11-5.0,5.3						0	
0	CO ₂ Concentration				11-5.0,5.3						0	
0	Regenerative-Fuel-				11-5.0,5.2	.1,					0	
	Cell-Based ECLS				5.3.2							
0	Recommendations				11-5.0, 5.3	3.2					0	
EVA	/EMU				11-5.0, 5.2	2.2					0	



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Final Report Topical Cross Reference Guide

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Communications & Tracking Subsystem			3.2.2.1.11	11-4.0						•	
Manipulator System				II-6.0						0	
Pointing Systems				11-8.0						•	
Thermal Management				11-9.0						•	
Crew				II-2.0				,			
o Tasks o Skills		5.2.5.3 3.1.2.5, 3.1.3.5, 3.1.4.5, 3.1.5.5, 3.2.1.5 3.2.2.6, 3.2.3		II-2.2 II-2.2.3						•	
o Capabilities o Role Relationships o Accommodations			3.2.2.1.11	II-2.2.2 II-2.3.2 II-2.4						0 0	

TABLE A-1
Final Report Topical Cross Reference Guide

Topic	Vol. 1 Exec Summ	Vol. 2 Mission Anal	Vol. 3 Rqm'ts	Vol. 4 Archit	Vol. 5 DoD	Vol. 6 Final Brief	Vol. 7-1 Sci/App Data Book	Vol. 7-2 Commer Data Book	Vol. 7-3 Tech Demo Data Book	Vol. 7-4 Archit Data Book	Vol. 7-5 Mission Data Book
										:	
Crew (Continued)											
o Habitability	0		3.2.2.1.11	11-2.0,2.4						0	
o IVA Work Stations				11-2.5.2						0	
o EVA Work				11-2.5.3						0	
Stations				11-5.2.2						•	
o Maintenance				11-2.5.4						0	
c Stowage			3.2.2.1.11							0	
o Windows			3.2.2.1.11	II-2.4.1						0	
o Hygiene			3.2.2.1.11	11-2.4.2.4				1		0	
o Scheduling			3.2.2.1.11	II-2.3.1						0	

APPENDIX 2 KEY TEAM MEMBERS

KEY TEAM MEMBERS

Subject	Boeing Team	Subcontractor Team			
Study Manager	Gordon Woodcock	ADL: Battelle: ECON: ERIM: Hamilton Standard: Intermetrics: Life Systems: MRA: NBS: RCA: SAI:	Dr. Peter Glaser Kenneth E. Hughes John Skratt Albert Sellman Harlan Brose John Hanaway Franz Shubert Col. Richard Randolph (Ret.) Dr. B. J. Bluth Dr. Herbert Gurk Dr. Hugh R. Anderson		
Technology Manager	Dr. Richard L. Olson	57.III	Dit niggi ku mileusen		
Mission Analysis					
Science & Applications	Dr. Harold Liemohn David Tingey (Earth Obs.) Dr. Derek Mahaffey (Mission Integration) Melvin W. Oleson (Life Sciences) Dr. Robert Spiger (Plasma physics, astrophysics, solar physics)	SAI: ERIM:	Dr. Hugh R. Anderson (Environmental Science) Dr. Peter Hendricks (Meterology/ Oceanography) Dr. Gil Stegen Dr. John Wilson (Life Sciences) Dr. Robert Loveless (Integration) Dr. Robin Muench Dr. Stuart Gorney (Life Sciences) Ms. Monica Dussman (Life Sciences) Albert Sellman (Earth Obs.) Dr. Irvin Sattinger (Earth Obs.)		
Commercial	Dr. Harvey Willenberg	ADL: Battelle: MRA:	Dr. Herbert Gurk Thaddeus (Ted) Hawkes Dr. Peter Glaser Dr. Kenneth E. Hughes Col. Richard Randolph (Ret.) Robert Pace		

KEY TEAM MEMBERS (Cont'd)

Subject	Boeing Team	Subcontractor	Team
Mission Analysis (Cont'	d)		
Technology Demon- strations	George Reid Dr. Alan G. Osgood David S. Parkman Steve Robinson Richard Gates Tim Vinopal		
National Defense	Robert S.Y. Yoseph	ERIM:	Mirko Najman
Space Operations	Keith H. Miller		
Architecture and Subsystems			
Architecture & Configurations	John J. Olson Brand Griffin Tim Vinopal David S. Parkman Steve Robinson		
Communications		RCA:	Donald McGiffney
Crew Systems	Keith H. Miller George Reid Dr. Alan G. Osgood	NBS:	Dr. B. J. Bluth
Data Management and Software	Les Holgerson	Intermetrics:	John Hanaway
ECLSS	Keith H. Miller	Ham Std:	Harlan Brose Ross Cushman Al Boehm Ken King Todd Lewis
		Life Systems:	Dr. R. A. Winveen Franz Schubert Dr. Dennis B. Heppner
Operations Analysis	Keith H. Miller George Reid Dr. Alan G. Osgood		
Orbit Analysis	Dani Eder		

KEY TEAM MEMBERS (Cont'd)

Subject Boeing Team Subcontractor Team

Architecture and Subsystems (Cont'd)

Orbit/Survivability Stephen W. Paris Analysis Merri Anne Stowe

C³I H. Paul Janes

Radiation Effects Dr. William C. Bowman

Requirements Analysis Lowell Wiley

Programmatics & Cost

Cost Analysis Ken verGowe ECON: Ed Dupnick

Programmatics Gordon Woodcock

APPENDIX 3 ACRONYMS AND ABBREVIATIONS

LIST OF ACRONYMS AND ABBREVIATIONS

AAP Airlock Adapter Plate Alternating Current Adaptive Delta Modulation AC ADM

Airlock Module AM

APC Adaptive Predictive Coders

APSM Automated Power Systems Management

ACS Attitude Control System ARS Air Revitalization System ASE Airborn Support Equipment

BIT **Built** in Test

BITE **Built in Test Equipment**

CAMS Continuous Atmosphere Monitoring System

C&D Controls and Displays C&W Caution and Warning

CCA Communications Carrier Assembly CCC Contaminant Control Cartridge CCTV Closed Circuit Television

CEI Critical End Item

CER Cost Estimating Relationship

CF Construction Facility CMG Control Moment Gyro

CMD Command CMDS Commands CO₂ Carbon Dioxide

Computer Processor Units

CRT Cathode Ray Tube

dB Decibels DC Direct Current

DCM Display and Control Module

DDT&E Design, Development, Test, and Evaluation

DOD, DoD Department of Defense

DT Docking Tunnel DM Docking Module

DMS Data Management System

DSCS Defense Satellite Communications System Environmental Control/Life Support System ECLSS Electrochemical Depolarized CO₂ Concentrator EDC

EEH EMU Electrical Harness

EIRP Effective Isotropic Radiated Power EMI Electromagnetic Interference EMU Extravehicular Mobility Unit EPS Electrical Power System

ET External Tank

EVA Extravehicular Activity EVC **EVA** Communications System

EVVA **EVA** Visor Assembly

FM Flow Meter

FMEA Failure Mode and Effects Analysis

ftc Foot candles

FSF Flight Support Facility FSS Fluid Storage System GaAs Gallium Acsenide

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

GN&C Guidance, Navigation and Control GEO Geosynchronous Earth Orbit

GHZ Gigahertz

GPC General Payload Computer
GPS Global Positioning System
GSE Ground Support Equipment

GSTDN Ground Satellite Tracking and Data Network

GFE Government Furnished Equipment

GTV Ground Test Vehicle
HLL High Level Language
HLLV Heavy Lift Launch Vehicle

HM Habitat Module

HMF Health Maintenance Facility
HPA Handling and Positioning Aide

HUT Hard Upper Torso

Hz Hertz (cycles per second)
ICD Interface Control Document

IDB Insert Drink Bag

IOC Initial Operating Capability

IR Infrared

IVA Intravehicular Activity
JSC Johnson Space Center
KBPS Kilo Bits Per Second

KM, Km Kilometers

KSC Kennedy Space Center

Ibm Pounds Mass

LCD Liquid Crystal Display

LCVG Liquid Cooling and Ventilation Garment

LED Light Emitting Diode
LEO Low Earth Orbit
LiOH Lithium Hydroxide
LM Logistics Module

LPC Linear Predictive Coders
LRU Lowest Replaceable Unit
LSS Life Support System
LTA Lower Torso Assembly

LV Launch Vehicle

lx Lumens

MBA Multibeam Antenna mbps Megabits per second

MHz Megahertz

MMU Manned Maneuvering Unit

MM-Wave Millimeter wave

MOTV Manned Orbit Transfer Vehicle
MRWS Manned Remote Work Station
MSFN Manned Space Flight Network

N/A Not Applicable

NBS National Bureau of Standards NSA National Security Agency

N Newton

NiCd Nickel Cadmium NiH2 Nickle Hydrogen

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

Nm,nm Nautical miles

N/m² Newtons per meter squared

OBS Operational Bioinstrumentation System

OCS Onboard Checkout System

OCP Open Cherrypicker

OMS Orbital Manuevering System
OTV Orbital Transfer Vehicle
PCM Pulse Code Modulation
PCM Parametric Cost Model
PEP Power Extension Package

PIDA Payload Installation and Deployment Apparatus

P/L Payload

PLSS Portable Life Support System

PM Power Module

POM Proximity Operations Module

ppm Parts per Million

PRS Personnel Rescue System

PSID Pounds per Square Inch Differential

RCS Reaction Control System
REM Roentgen Equivalent Man

RF Radio Frequency

RFI Radio Frequency Interference RMS Remote Manipulator System RPM Revolutions Per Minute

RPS Real-time Photogrammetric System

SAF Systems Assembly Facility
SAWD Solid Amine Water Desorbed
SPGaAs Space Produced Gallium Arsenide
scfm Standard Cubic Feet per Minute
SCS Stability and Control System
SCU Service and Cooling Umbilical
SDV Shuttle - Derived Vehicle

SDHLV Shuttle - Derived Heavy Lift Vehicle
SEPS Solar Electric Propulsion System

SF Storage Facility
SM Service Module

SOC Space Operations Center SOP Secondary Oxygen Pack SRB Solid Rocket Booster

SRMS Shuttle Remote Manipulative System

SRU Shop Replacable Units
SSA Space Suite Assembly
SSME Space Shuttle Main Engine
STS Space Transportation System
SSP Space Station Prototype

STAR Shuttle Turnaround Analysis Report
STDN Spaceflight Tracking and Data Network

STE Standard Test Equipment
TBD To Be Determined

TDRSS Tracing and Data Relay Satellite System

TFU Theoretical First Unit TGA Trace Gas Analyzer

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LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

TIMES	Thermoelectric Integrated Membrane Evaporation System
TLM	Telemetry
TM	Telemetry
TMS	Teleoperator Maneuvering System
TT	Turntable/Tilttable
TV	Television
UCD	Urine Collection Device
VCD	Vapor Compression Distillation
VDC	Volts Direct Current
VLSI	Very Large Sacle Integrated Circuits
VSS	Versatile Servicing Stage
WBS	Work Breakdown Structure
WMS	Waste Management System